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The Farmer's Digest

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The Farmer's Digest

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The Farmer's Digest

Volume 5 October, 1941 Number 6

Cover Farming

Condensed from Successful Farming

Carlyle Hodgkin

THE endless, ever-pressing problem of farmers over that broad region extending roughly from the Cornbelt to the Rocky Mountains is to get enough water into the ground to grow crops. With their attention focused on this key problem of the Plains area, two soils research men set to work in the spring of 1938. What, they asked themselves, might Plains farmers (and Cornbelt farmers, too) do to make better use of the rain that falls?

The two experimenters are Dr. F. L. Duley, a soils man of previous experience in both Missouri and Kansas, and Professor J. C. Russel, of Nebraska. Their work is set up as a co-operative project between the Research Division of the Federal Soil Conservation Service and the Nebraska Agricultural Experiment Station. The new thing these men are developing is a system of tillage that keeps the crop residues *on top* of the ground instead of plowing them under. Interested outsiders watching their progress have dubbed this system "cover" farming. To work the land successfully with straw, stubble, or cornstalks left on top, the two men have had to improvise their own tools—tillers, cultivators, drills, packers. Manufacturers have watched this work closely from the beginning, however, and are developing machines adapted specifically for this new way of farming.

The primary tool they've employed Duley and Russel call a "subsurface tiller," and its operation in the field, "subsurface tillage." The machine consists of a series of large V-shaped sweeps that run level, two, four, or six inches deep and pulverize the soil without turning it upside down. Thus most of the straw or other "cover" remains on the surface. Ahead of each sweep is a rolling coulter that keeps the machine

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from clogging, even in heavy trash. Subsurface tillers are now being made by several manufacturers with sweeps ranging from 20 to 45 inches wide. Other types using blades or bars are also used.

"What we hope to find eventually," Duley said, "is a practical, workable scheme to give the soil continuous, year-round protection by crops and crop residues."

Evaporation, these men believe, is a great moisture thief in the high Plains country, getting away with far more of the annual rainfall than is generally realized. In hot, dry weather it will take all the available moisture out of the top six inches of bare soil.

In one test, during which 17.9 inches of rain fell, land covered with straw at the rate of about two tons per acre saved 9.7 inches of water, or 54 percent. Two tons of straw per acre, Russel said, is about equivalent to the straw and stubble left on the ground after fairly heavy wheat has been combine-harvested.

In the same test, bare basin-listed land saved only 4.9 inches, or 27.4 percent, of the water. None of the remaining 13 inches ran off, because the basins never were overflowed, so the research men assume it all must have evaporated.

There was no apparent runoff from the straw-covered plot, but bare plowed ground in the same test lost water by both evaporation and runoff. It saved only 3.7 inches of the water, or 21 percent. Long experience indicates that bare summer fallow will, as an average, conserve for crop use about 25 percent of the season's rainfall. In the test cited above, bare fallow saved only 21 percent whereas the straw-covered fallow saved 54 percent. And in other tests straw-covered fallow conserved 15 percent of the moisture when the summer was so dry that bare land saved no water at all. Should subsurface tillage prove to be consistently more efficient as a moisture-saving method, its value to the Great Plains and other low-rainfall regions would be incalculable.

Now comes the part of this research of greatest interest to farmers in the Cornbelt. Working with L. L. Kelly, agricultural engineer for the Soil Conservation Service, Duley studied the rate at which water will go into the ground. They found that dry, bare soil will take in water very rapidly at first and then more slowly. Why?

"Put your hands down flat on the surface of a plowed field during or just after a heavy rain," Duley said, "and you can feel why. Dig up a small section of soil after the rain and you can see why." The grinding, churning action of hard rain on the soil, he explained, soon forms a

fine, compact, almost waterproof surface layer. It usually is not more than one-sixteenth inch thick, but it fits over the surface like a skin. No matter how much empty pore space in the soil below, it can be filled no faster than the water can get through that surface layer.

Crop residue on the surface tends to prevent formation of this surface film. When the research men applied water on bare and straw-covered land, the intake rate at first was about the same for both. On the bare land, however, it soon decreased to a rate of one-quarter inch per hour, becoming practically constant at that point. The straw-covered land, even after several hours of continuous "rain," continued to take water at the rate of three-quarters inch per hour.

In the Cornbelt soil-erosion control is a key problem, one that Duley and Russel are working on now. Can subsurface tillage be adapted as a practical, effective means of erosion-control in this great region? The preliminary findings are at least encouraging. In one test, during which 7.12 inches of rain fell, the two men measured both the runoff and erosion from bare and straw-covered ground.

The straw-covered ground lost 1.26 inches of the water by runoff, and the water carried away soil at the rate of 2.2 tons per acre. The bare, disked ground lost 3.06 inches, and the water carried away soil at the rate of 26.8 tons per acre. Thus the runoff from the bare, unprotected soil was 2.4 times as much, but the soil loss was 12.1 times as much as on soil protected by crop residues.

The two research men are at work now to develop a practical scheme of growing corn by subsurface tillage. They have subtilled heavy wheat stubble and planted corn by means of furrow-openers on the planter. In other tests they have worked down cornstalks with a stalk-cutter and then planted the corn with a subsurface tiller, mounting a planter box over each second 21-inch sweep. They have tended the crop with subsurface sweeps mounted on the beams of a corn cultivator.

By these methods Duley and Russel have been able to get good corn yields and at the same time greatly reduce soil-erosion. Why? Because the surface of the soil was kept protected throughout the season by residues from the previous crop. Continuous, year-round protection!

The work Duley and Russel started is by no means done yet. It is only well begun, but it has produced results. Some of their findings are taking on significance, not only for the Great Plains, but for the whole vast

Cornbelt and for the South and possibly for other farming regions of the country.

"Cover" such as straw or chopped cornstalks on the surface of the land, they have found, will do four highly important things. It will enable the soil to take water in more rapidly, prevent wind erosion almost entirely, sharply reduce run-off and water erosion, and reduce the water loss from the soil by evaporation. Nature has set the example by protecting her soil with a thick carpet of grass. But farmers up to now have plowed under that cover, leaving the bare soil exposed to the forces of water, wind, and sun.

Though the whole idea still is experimental, a few farmers in Nebraska are beginning to try it on their own hook. And the effectivness of soil cover against wind erosion has been apparent at once. "If this had been developed 15 years ago," one fellow said, "we wouldn't have had those terrible dust storms during the drought years." It seems reasonable to think, in fact, that had subsurface tillage or "cover" farming been in general practice, there might never have developed the great Dust Bowl.

Who Will Milk and Do the Chores?

Condensed from Land Policy Review

Margaret M. Fellows

AMERICAN scientists have yet to devise a cheap machine for doing farm chores —that daily grind for many farmers who cannot hire a full-grown hand. But the application of plain horse sense is helping the privately endowed Bowdoin Farm Training School to answer, for hundreds of small New York farmers, the question, "Who will milk the cow while Farmer Jones attends to more important matters?"

The school was started primarily to aid boy victims of the depression, and for a decade has supplied farmers, at a price they can pay, with trained, intelligent, willing lads, eager to get a foothold in America's largest industry. The institution, one of the few to which a boy can go free of will and free of charge to learn practical farming, is the Dutchess County outpost of The Children's Aid Society of New York City. It was launched in 1929 when a New York philanthropist, George T. Bowdoin, donated his country estate to the Society.

Lying on the fertile banks of the Hudson River near New Hamburg, the model community has been able to guarantee its graduates jobs during the entire depression. Today, the demands of satisfied farmers for trained boys actually exceeds the supply by some 50 percent. The courses, open to any healthy qualifying lad in the United States between 16 and 21; takes 6 months to complete. More than 200 boys a year are trained, the maximum number that can be handled at one time on the 327-acre farm.

The program is intensely practical. Books are eschewed in the regular courses; it is not the purpose of the school to turn out agricultural theorists. Experience, for boys and staff alike, is the teacher. A decade of experiment has ironed out the wrinkles, streamlined every part of the curriculum to accomplish in the best and quickest way the task of making these adolescent agriculturists "livable" and "serviceable" — prerequisites for happiness in all human labor.

Many problems have been met and dealt with quickly, often with inspired ingenuity. For example, in the early days of the school, farmers complained that students, hired out as expert milkers,

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could not stand the strain of milking a small herd of 5 to 10 cows. Investigation revealed that the boys knew how to milk well, but that they lacked the continued practice that develops the particular arm and back muscles used in milking. Insufficient funds would not allow additions to the school's herd of 25 Holsteins, so the faculty put its collective mind to work. In short order a rubber udder, lined with water-soaked sponge, was devised, and each student was made to practice a half hour on this udder daily. Complaints from the farmers stopped abruptly with the new crop of artificial-udder trained graduates.

Throughout his 6 months of study, the Bowdoin Farm student finds a duplicate of every situation he could possibly encounter on the farm job. The estate has been laid out as an exact model of a typical farming community—its ways of work and worship, its customs, pleasures, taboos. Advanced students live in farm cottages, four to eight boys to a cottage. A farmer and his wife, hired for their knowledge of boys and understanding of the American farmer's folkways, head each of these cottages. For months these couples are mothers, fathers, employers, and guardians to their broods.

From the rising hour before dawn to bedtime shortly after sundown, farm routine is observed. For an hour before breakfast chores are done around the house, while the farm mother creates the typically huge farm breakfast. A bell calls the workers to grace and meal, from which they rise to receive their various chore assignments in the fields, cowbarn, horsebarn, henhouse, or wherever. Most homely and most popular chore with the students is helping the farm mother. A month is devoted to this important task to teach the lads the important job of "learning to know the womenfolk." They plan the kitchen garden, do odd jobs, run errands, dry dishes, scrub floors. For pay they get extra cookies, for punishment a woman's derision for a male bungler. And the result is a boy who has mastered the task of getting on with the farm family.

Life in the cottages is intimate, pleasant, and instructive—but the student must first show that he has a right to it. The newcomer is installed in Hillside House, a rambling 19th century farmhouse with the top floors fitted out as dormitories. When he has proved through work and play that he can assume the responsibilities of family life in the cottages, the student is promoted to one of them. Sometimes badmannered or surly cottage-dwellers are demoted to Hilltop. But almost invariably the boys learn

the value of acquiring the quality described by the farm mothers as "livability."

Chores, stiff at the start, get stiffer. Every student must spend a month of the hardest kind of labor in the horsebarn, dairy, henhouse, carpentry and painting shops, and piggery. Weeds among the boys, as among plants, are quickly uprooted — the law of selection rules. But, more often than not, the health-giving work in the fields and the new, bright opportunities ahead bring out characteristics that may have remained dormant.

City-bred Andy Moulton, for example, overcame a reputation for uselessness in a few months. He was a city tough, who after he had been accepted, boasted that he had joined up to take a free vacation in the country. He would have quit after the first week's workout, he later admitted, if he had been able to take his comrades' laughter. Toward the end of the second month, however, Andy discovered and admitted that he liked hard outdoor work. And shortly afterwards, Andy became interested in poultry. His toughness turned to determination, and after graduation he received a position at $20 a month with room and board. He saved every cent he earned for 3 years and at the end of that time made a $600 down payment on a chicken farm of his own. Last year Andy's profits amounted to more than $1,500.

City and Country Boys

Boys like Andy, city boys, often make slicker farmers than country boys, because the latter sometimes must unlearn faulty practices. City boys start from scratch and learn the right way of doing things. At times they can even tip their employers to better farming methods.

One ex-city fellow who hired out to a truck gardener in Ulster County toward the end of last November was appalled to see unused farm machinery dotting the landscape. Plows, reapers, and harrows had been left just where the farmer had happened to finish with them. Wasting no time, he hauled the idle machines into the barn as he had been taught to do, and cleaned, oiled, and painted them in an afternoon.

The next day the employer, slightly ruffled, scolded him for "boondoggling when there's more important work to be done." In the spring, though, the farmer found that not a single replacement due to rust had to be made on any machine, and admitted he was saved a pretty bill he did not know could be avoided.

The school has a rotating curriculum. A boy can be enrolled or graduated at any time. Ordinarily such a system would see

some students cheated out of ploughing and planting—others out of harvesting. At Bowdoin, however, a boy who enters in an off-season is put to work ploughing a special "practice plot" of three acres. His planting and reaping, if missed outdoors, he will get in the two greenhouses during the winter. Overlapping classes in this manner also make it possible to put the new boys with the more experienced. On the entire farm only a dairy specialist and a poultry expert supervise the boys at work, and then only when a new technique must be learned. On their own from morning until night, the boys develop a sense of responsibility about their work.

The farm is run with no eye to profit. It was discovered early that the moment special attention is paid to raising large, quality crops, the quality of the boy crop fails, and the essential point of the enterprise is blunted. Successful harvests are consumed by the students at the school—an elastic food budget makes up for any crop failures.

A painstaking check is made on each prospective employer before a job is accepted for a boy. A constant watch is kept on farmer and boy afterward. Nothing but permanent positions are accepted. Each employer must agree to take the boy into his own social circle without reservation. If a farmer falls down on his part of the bargain or tries in any way to exploit his young worker, the boy is placed in another job.

One stout-backed 18-year-old, called Sleepy Joe by his mates, got himself a wife and a part ownership in a farm last spring. He arrived at the farm to start his first job only to find that his employer, down with lumbago, was in despair for fear he could not get the planting done in time. Sleepy Joe, who had never worked on a farm before Bowdoin, had to take over completely. The farm ran like a charm for the 2 months that the farmer was laid up.

Boys who wish to specialize in a particular branch of agriculture are encouraged to do so—if they can fit it in without neglecting their regular chore duties at the school. Many lads with special aptitudes or with extraordinary diligence are encouraged to take further courses in the State agricultural colleges, and are helped financially to do so by The Children's Aid Society.

More than a score of such lads have been graduated from Delhi and Farmingdale in the past 3 years, all of them with at least a B average.

All the boys, of course, don't trail clouds of agricultural glory from graduation on. The Children's Aid Society does not expect them to. It is glad if the 6

months at the school gives them courage, independence, and health for the hard fight, and it is delighted when a farmer is helped to solve his problems.

Probably, however, the most important point of the entire work is that a private enterprise, at a time when Government agencies seem to be the only solutions to such problems, has operated to solve an agricultural and employment situation with success.

MAKING GOOD ON THE JOB

A Speech by Edward Wywiurka at Bowdoin Farm School Graduation Exercises, March 1, 1941

As an alumnus of Bowdoin Farm, I am glad to be back again to witness another graduation. You boys will soon be going out on jobs and I know you all want to be successful. I would like to give you some advice that will be useful in helping you make good on your job.

First, *you must be interested in your work and do more than you are paid for.* Don't say to yourself, "I won't work hard because I am not being paid for it." If you want to advance in your job and get a higher wage you must give more than you receive. A man hires you with the idea of making profit from your labor, not to break even.

The second rule is, *don't be idle at any time.* There is always work to do on a farm; you can curry cows, sweep down cobwebs, wash windows, and do many other odd jobs. There is no excuse for your being without work.

If you want to be liked by all, *do things willingly and cheerfully.* Don't hesitate to carry an armful of wood into the house or even help wash and dry dishes. By doing this you will make a hit with the entire family.

There are some habits that should be developed if you want to keep out of trouble.

You should always shut doors behind you and put out lights when leaving a building. A bull or a cow may do a considerable amount of damage when it gets out of the barn or pen. Also a big electric bill may cause a drop in your wages.

Develop the habit of putting things back where they belong. The boss doesn't like to see his tools lying around in different places where they were last used.

Do these things and you can't help but make good on your job.

You shouldn't be satisfied with being a hired man all your life. If you are interested in a certain field of agriculture go to school and follow it up. I advise you to work for one year and save all the money you can and then go to some agricultural school. The time and money you spend on education will be returned manyfold.

Peanut Meal as a Source of Protein

Condensed from The Jersey Bulletin

F. R. Edwards and Z. A. Massey

PEANUT meal is proving an outstanding feed for livestock. Actual experiences of stockmen coupled with the growing amount of authoritative data from experiment stations all emphasize the increasing importance of this type of feed.

Being a by-product of the manufacture of oil from shelled kernel, peanut meal has proved to be one of the best protein supplements for livestock feeding. This is due not only to its richness in protein and total digestible nutrients, but also because it is well liked by stock.

The product left by the crushing process, when finely ground, is peanut meal. It has been used for many years on a more or less limited scale with good results, and is not in the untried stage.

Tests have shown that peanut meal of the best grade is fully equal to the best grades of linseed meal, cottonseed meal and soybean meal in feeding value for the different kinds of livestock. Probably its most extensive use until now has been for feeding dairy cattle. In recent years, however, the use of peanut meal as a protein supplement in swine feed has been increasing. Likewise, its importance in feeding beef cattle has taken a sharp increase.

Steadily expanding livestock production, particularly in the southeastern states, is providing a market for this feed. Once stock owners the country over realize its fine qualities and begin to utilize it in their feeding program, it is highly possible that the peanut grower will find in peanut meal his best outlet for the sale of peanuts.

Peanut meal contains many of the important amino acids that give it high rank as a source of vegetable protein. These, such as lysine, tryptophane, and methionine, are all necessary for proper growth and body maintenance.

Since proteins are made up of amino acids, the value of a protein feed depends upon the kinds and amounts of amino acids composing it. The acids are what the animal uses in building up the many and varied tissues, organs, and parts of the body in growth, milk production, reproduction, and in carrying on the processes of life.

Peanut meal is fairly rich in lysine, an amino acid absolutely essential for growth. It also hap-

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pens that some of the amino acids contained in the meal are the ones usually lacking in cereal grains, making the feed particularly adapted for balancing a ration composed of these ingredients.

The oil in peanut meal is also of high value. Digestion experiments have shown that it is as readily digested as animal fats and is utilized as completely. It has been shown that lack of sufficient fat or oil in the ration of dairy cows can greatly reduce the cow's efficiency for milk and butterfat production. For this reason the high oil content of peanut meal is valuable.

Other work has demonstrated that peanut meal contains an abundance of the vitamin B complex essential for growth and health. The United States Public Health Service has determined that refined peanut meal is an excellent source of the vitamin that prevents pellagra in humans. This same vitamin prevents similar troubles in swine and other domestic animals, as indicated by work at the Pennsylvania Experiment Station.

As further proof of the value of this feed, a study by Daniels and Loughlin showed that peanuts are almost a complete food for rats. They needed only to be supplemented with vitamin A and certain minerals. Rats are not only very similar to humans in their food requirements but also to certain domestic animals.

For dairy cows the Virginia Experiment Station found peanut meal from eight to ten per cent more efficient than cottonseed and soybean meals and especially desirable for supplying proteins. Likewise, in tests with dairy cattle in Delaware, the results indicated that "one pound of digestible protein in peanut meal is three per cent more efficient for milk production than one pound of digestible protein in soybean meal."

A comparison has been made in Texas between peanut feed containing 38 per cent crude protein and cottonseed meal (42 per cent protein) showing the peanut feed superior to cottonseed meal on a basis of digestible nutrients although not on a basis of equal weights. A mixture of the two was found to be superior to either feed without the other.

The Georgia Experiment Station has found that peanut meal will produce firmer butter than some other common feeds. This effect is desirable in warm weather to counteract the softening effects of certain other feeds.

An interesting test was made in Georgia comparing peanut meal with cottonseed meal in a good dairy ration. The two meals were selected to be as similar in analysis as possible (peanut meal, 43.4 per cent crude protein; cottonseed meal, 43.2 per cent

crude protein). The cows were matched as closely as possible and were fed mixtures consisting of 30 per cent ground shelled corn, 25 per cent ground oats, 20 per cent wheat bran, and the remaining 25 per cent as the variable: either cottonseed meal or peanut meal.

A salt and mineral mixture was added, and similar roughage was fed. Amounts of concentrates fed each animal were regulated by the cow's appetite and were limited only to avoid marked gains in body weight. Detailed results are shown in the following table:

COMPARING PEANUT MEAL AND COTTONSEED MEAL FOR MILK COWS

(averages per cow)

	Peanut Meal	Cottonseed Meal
Daily milk production (lbs.)	14.46	14.02
Butterfat test (per cent)	4.37	4.33
Daily butterfat production (lbs.)	0.632	0.607
Gain in body weight, 112 days (lbs.)	7.25	10.50
Daily feed consumption:		
Concentrates, dry matter (lbs.)	5.65	5.79
Roughages, dry matter (lbs.)	9.63	9.63

The findings reveal peanut meal to be somewhat better than cottonseed meal for the production of milk. The butterfat test was slightly higher when peanut meal was used but the difference is probably too small to have significance. Figuring feeds at the same price—concentrates $1.50, hay 75 cents, and silage 35 cents per hundredweight—and body gains at beef prices, 5 cents per pound, the feed cost of butterfat was 21.25 cents per pound when peanut meal was used and 22.27 cents when cottonseed meal was fed.

In another Georgia test with peanut meal fed to growing dairy heifers, results were conflicting in some respects. During the first season, growth and gains in weight were greater for the heifers not receiving the peanut meal, but during the second season, heifers receiving peanut meal did better than those that did not receive any.

Later when these heifers dropped their first calves, it was found that the calves from heifers that had received the peanut meal were noticeably stronger and larger than those from the other heifers.

Summing up all available information on peanut meal as a feed for dairy cows, it is apparent that it is one of the very best high-protein feeds available for milk production. The evidence indicates that it is fully equal or possibly slightly superior to such comparable feeds as cottonseed meal and soybean meal of similar protein content. It is very palatable to cattle of all ages.

The Man Without a Plow

Condensed from Capper's Farmer

George A. Montgomery

FEW and simple were the principles of agriculture Chris Bixel, Swiss immigrant, had learned in his native Alps. There, steep hillsides remained in Nature's sod. Cows ate the grass. The husbandman took the milk, kept back what his family needed, and made the rest into cheese to sell for other wants of livelihood. Forced to venture in a new land because his own was overcrowded, Bixel took a farm in Goodhue county, Minnesota, because its broken terrain resembled that of his own Switzerland more closely than any other he could find.

There, except to a few of his Swiss neighbors, he was marked as a queer man. He owned no plow. While other farmers tilled their corn and bent their backs to harvest, Bixel milked his cows twice a day, made his cheese and puttered in his garden. Each fall he hired two neighbor boys, Otto and Adolph A. Andrist, to drive his surplus, grass-fattened cattle to market, and he followed in a wagon loaded with cheese. He sold the products of his soil, bought and loaded needed commodities and, with the boys, retraced his way along the prairie trail.

Once he showed his young helpers the money he was taking home. On young Adolph Andrist, it made a profound impression. He never had known anyone to have so much at one time. And, of all persons, it was Chris Bixel, the neighbor who didn't sweat and slave like other farmers, the man without a plow! The boy was old enough to begin reasoning things out for himself. He pondered the matter as they rode on, and concluded people had misjudged the Swiss dairyman. Back home, he remarked to his father: "When I strike out for myself, I am going to farm like Chris Bixel."

The man from the Swiss Alps years ago passed on, but his idea still lives. On a neighboring farm of 91 acres, Adolph A. Andrist has been a sod cropper more than 30 years. Unlike his preceptor, he owns a plow, but it turns no soil except his garden. Building sites, roads, garden and woodland occupy 12.4 of the 91 acres; the other 78.6 acres are in grass crops grown for cow feed. Andrist rents no land and buys

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little provender, yet he wintered 54 Holsteins last year; 64 the previous one. For the latest full year completed, milk and veal calf sales aggregated more than $3,400, and all his herd ate that the farm didn't grow cost $146.24 —$128 of it for 12 acres of fodder, and the rest for 96 bushels of oats he fed to calves. Value of products above feed outlay was $3,254, which is $41.40 for each productive acre.

That isn't to say, of course, that each acre of grass brings more than $40, for from income must be deducted cost of trucking milk, allowance for operating labor and other expenses incidental to production. The figure is set down to show it isn't necessary to cultivate land to hold up gross income, which is the return before overhead costs are deducted. And no one has to be told that overhead is less when there are no charges for plowing, seed, sowing, cultivating and harvesting—a condition that applies to 52 acres of permanent pasture harvested by grazing animals. Ten other acres of mixed bluegrass and white clover are grazed to June 1, when cows are removed a month to get a hay crop, then are turned in again.

Andrist does not believe it ever will be necessary to plow up the other 16.6 acres, where alfalfa has been seeded down 7 years. He has kept up the stand by hiring a neighbor with tillage tools to scratch the surface and cover seed he has scattered on thin spots in August. Aside from this outlay, the only expenditure is in labor to harvest the hay. Alfalfa produces annually up to 6 tons an acre, and the bluegrass-clover mixture 2.2 tons. Such a farming program requires little power and equipment—a 2-horse team, mower, side-delivery rake, loader, rack and manure spreader.

Cows graze bluegrass from the time snow is off until it is covered again. During that period they harvest all they eat. No protein concentrate ever is fed, and the only grain the herd gets is that in fodder which supplements alfalfa hay in winter. In years when corn is well eared, those in milk may consume 10 bushels apiece; in other winters, half that much. Most of the cows freshen in May; the others in early June. Coming in when grass is at its best, they push off with a heavy flow of milk. New growth on the 10 acres of pasture mowed for hay supplies the high protein feed to hold them up on riper grass in July and August, and alfalfa meadow gives them another spurt in the fall. However, Andrist is careful not to graze legumes hard enough to weaken the stand.

Fodder generally is fed until February 1. With no grain to supplement roughage after it is discontinued, cows drop off

abruptly in production, and by February 15, Andrist has dried them off for a rest of 10 weeks or more before the next freshening. A longer lactation, or one started at another time of year, would require more grain. Shifting heaviest production to any period other than the pasture season would require purchase of protein supplement in addition to grain.

Since he is not in a testing association, Andrist does not know exact production of his cows, but the plant to which he sells paid him last year for 248 pounds of fat a cow. Each calf, before it is weaned, gets 900 pounds of whole milk containing 30 pounds of fat. He is convinced a cow not overworked with too much rich feed has a longer productive expectancy than one held at top production through long lactations by heavy feeds of grain. He has a cow 18 years old, and 8 others are more than 12. All, he says, produce nearly as much as in their prime.

So much for the herd under the Andrist system of management; what about the land? The farm is cut thru by a natural water channel that drains a large area of steeply rolling land above. When snow melts in spring, runoff is abnormally heavy, and the stream at that time usually overflows 30 acres of bottom land to lay down in the bluegrass a layer of yellow silt brought from hillsides denuded of black loam and in some cases deeply gullied. The overflow area, which should be the richest soil he has, is the only tract Andrist believes is less productive than when he acquired the farm. All manure is hauled to steep upland fields, and he believes they yield twice as much as when he bought the raw land. When an experiment station worker who came to the farm to make soil tests suggested he should cover this bottom with the spreader, he demurred; manure is too valuable to be carried away by floods. Even on the sharpest slopes, roots have tied down the black soil, and not a gully can be found there.

Delegations of farmers from a wide area, realizing something must be done to save their soil, have made tours to the farm. They go away convinced Andrist has shown the way to utilize rough land. As they walk about the place and hear its history it is hard for them to realize that this rough tract, bought without improvements at $56 an acre with a down payment of $500, should have produced enough to retire the debt in 6 years, pay for the set of buildings on it, and provide a livelihood for Andrist, his wife, and a family of ten children, now grown to manhood and womanhood.

What of boys who grow up to

that type of farming? Rolland, youngest son, recently entered into a 50-50 stock share agreement to operate his father's 91 acres. Orian Andrist and Arnold Andrist, operated 160 acres on a 50-50 lease until they were able to rent it at $4 an acre and put it to grass. They have seeded all but 12 acres. As soon as Otto Andrist was able to buy a 40-acre tract, he put it all to sod crops. Other sons are tenants under 50-50 agreements or leases of conventional type because they cannot find farms whose owners know what a sod cropper can do.

Calcium Needed in Fattening Rations

Beef cattle feeding tests at the Kansas Agricultural Experiment Station show that more rapid and economical gains result when one-tenth of a pound of ground limestone per head daily is added to the ration of steer calves not receiving alfalfa or other leguminous hays which normally contain high content of calcium.

Two groups of steers were fed a basal ration consisting of shelled corn, sorgo silage and cottonseed meal. One lot was fed, in addition, one-tenth of a pound of ground limestone per head daily. This latter group required 98 pounds less corn, 101 pounds less silage and 13 pounds less protein meal to produce 100 pounds of gain than did the group of steers not receiving the added calcium. On the market, the calcium fed steers commanded a 50 cent per cwt. higher selling price than the other group.

The economy resulting from the feeding of calcium in rations low in this needed mineral can be seen readily, particularly when one considers the feeding of a large group of steers and intends to put on several hundred pounds per steer.

—*Shorthorn World*

The Karakul Industry

Condensed from The Western Farm Life

O. M. Cook

HAS any progress been made in the Karakul industry during the past few years? Is there a market for the lambskins? Can the hair be utilized successfully?

Yes, definitely yes, is the answer to all three questions.

During the past two years the Karakul industry has grown to the point where it is one of the recognized fur producing industries. The number of breeders has increased to several hundred in the western states of Idaho, Colorado, Wyoming, Montana, Oregon, Washington, and California. The southwestern states of New Mexico and Arizona also have more breeders than heretofore.

In the past there were so few Karakul breeders in the United States that it was impossible to get fur buyers interested in lambskins to any extent. That difficulty is largely overcome. There are now enough breeders in various sections to get together sufficient lambskins to make it worthwhile for fur buyers to handle the pelts.

Better prices and quicker returns to the producers have gone hand in hand with expansion and the trend toward concentration of breeders. This is borne out in a letter from a New York fur buyer who describes his company's method of handling Karakul skins or pelts:

"Upon receipt of shipment our sorters inspect and grade the skins and a valuation is put on the lot. On the same day this valuation is air-mailed or telegraphed to the breeder. Until we receive acceptance the shipment is held separate in electrically-protected steel vaults and fully insured. Immediately upon receipt of acceptance a check is air-mailed to the breeder so that he may receive remittance in the shortest possible time."

The market presently is very active in spite of the fact that this country is now consuming the entire world supply of Persian lambskins. Price levels have continued firm to strong with cheaper grades displaying greater strength than the finest assortments.

L. F. Kelley, manager of the United Karakul and Fur Company, now has a retail store at Great Falls, Montana, where he

Reprinted by permission from Western Farm Life, Denver, Colorado, July 15, 1941

handles not only madeup Persian lamb coats, made-to-order garments, and matched bundles of lambskins, but also robes, blankets and sportswear from the Karakul hair. His brother, Addis Kelley, has a similar store located on his Karakul ranch at Upland, California.

Utilize Long Wool

A woolen mill in Oregon has installed special equipment to handle the long staple hair-like wool of Karakuls and cannot seem to get enough of the hair to supply the growing demand for the products. They make both fringed automobile robes and utility blankets of 100 per cent Karakul hair. They also make a fluffier blanket of slightly lighter colors by mixing a small percentage of white native sheep wool with the Karakul hair.

A considerable amount of yardage material for suits, coats and sportswear is also manufactured, using a large percentage of Karakul hair. They do custom manufacturing for breeders, many of whom have the hair made up into robes and blankets.

One southern Idaho breeder, Mrs. M. E. Syster, who each year has her entire output of Karakul hair made into these items, has been so successful in disposing of the hair in madeup material that she has purchased extra hair at times to have enough of the robes to supply her customers.

Proof in the Fiber

It was the concensus for a time that because of the long hair-like quality of Karakul wool, it could not be made up without mixing considerable white wool with it. That theory has been definitely antiquated.

In March, 1940, a display of Karakul products, including lambskins and other items, was conducted in the patio of the administration building of agriculture in Washington, D. C.

Too many of the earlier Karakul breeders experimented the wrong way. They thought that by having a few Karakuls and doing some elaborate cross-breeding they would soon develop a large valuable herd. In a short time all they had was a flock of crossbred animals with no fur value in lambskins produced. Those who stayed with straight Karakul breeding, using only rams from fur-tested flocks and good quality ewes, succeeded.

Hadenfeldt brothers of Rupert, Idaho, are among those who went at Karakul breeding the right way. They have stayed with straight Karakuls, specializing in producing fur-tested rams. After 6 or 7 years, they are still enthusiastic breeders, with one of the finest small flocks in the West.

Critchfield brothers, of Oakley, Idaho, are also among the earlier Karakul breeders who are making a continued success by for-

getting about cross-breeding.

If a person is financially able to carry on without requiring a profit from his breeding operations, he can in time build up a good flock by crossbreeding. But it requires plenty of time, for no appreciable fur value can be obtained until the fourth or higher cross.

Another phase of the Karakul industry is that of the cocoa or brown type. One Idaho breeder, through a period of approximately 6 years, has bred up from the cocoas with white sheep, until he now has a nice herd of white Karakuls.

The Karakul industry has very definitely made progress. With government research and reports showing only approximately 1 per cent of the Persian lambskins required for the demand of the American fur trade, being produced in the United States in 1938, there need be no fear of over-production for a great many years.

A Lawn That Doesn't Need Mowing

Dichondra repens is a species of creeping plant that recently has received much attention as a lawn substitute in California. It is a plant that stays green throughout the year, does well on poor soils, stands heat and some drought after it is established, has few disease and pest enemies, stands hard usage and does not need to be mowed.

Seed has not been available and Dichondra has been increased exclusively by division. Squares of sod are planted 6 to 10 inches apart over the area to be put in lawn, and within six months to one year the ground surface should be well covered.

The principal drawbacks to Dichondra are the high price of plants at present and the fact that it spreads so rapidly that it may become a pest. This second difficulty may be overcome by using Dichondra in areas confined by walks or driveways, or by edging the plant frequently. There is little likelihood of the plant becoming a serious pest under such conditions, as its roots form a sod only about 3 inches deep.

—Pacific Rural Press

Swine Erysipelas

Condensed from Hog Breeder

Dr. K. W. Stouder

Iowa State College

THE swine industry is of such importance as a means of marketing our enormous grain crop and as a source of cash income to our farmers that we of the midwest are jealously guarding against the encroachment of disease and parasites. This problem is not so much one of new diseases as it is that of constantly changing conditions under which commerce is conducted that makes this problem difficult. Increasing numbers of swine on our farms provide better opportunity for contagious and infectious diseases to spread from herd to herd. An increased number of vehicles that move long distances and many of which actually enter our farmsteads constantly create new problems of sanitation that only a few years ago did not exist. Some natural phenomena have also had a part in the spread of contagious diseases to new areas in the recent past.

A good illustration of this is the constantly wider spread of swine erysipelas across the corn belt and beyond in recent years. We have known that this disease existed in certain rather isolated parts of the United States for many years but mostly where hog raising was not of major importance. It was frequently and positively identified in certain parts of South Dakota ten years ago as the cause of about half of the cases of infectious diseases of swine diagnosed in that state. Later during and after the drouth years with the swine population reduced there it was not met with so frequently for awhile, but it is interesting to note that during this period the disease has spread to at least 30 different states indicating that the movement of swine out of the drouth area and from place to place in nearby feeding territory has doubtless contributed much to wider occurrence of this infection over the corn belt and over the nation. Today it is estimated that it is the cause of from 10 to 20 per cent of our losses of swine from infectious diseases.

This disease is an infection primarily of shoats, but may be seen in hogs of all ages. It is

Reprinted by permission from the Hog Breeder, Chicago, Ill., July, 1941

caused by a specific micro-organism known as the *Erysipelothrix rhusiopathiae* or bacillus of swine erysipelas, which is eliminated from the bodies of infected animals and also from so-called "healthy carriers" mostly by the way of feces and urine. It is picked up by animals eating or drinking contaminated food or water or by rooting infected soil.

Chronic carriers or animals which are not visibly sick often are kept on premises which distribute this infection over the soil and thus infect later generations of swine raised there. In addition we must recognize that certain strains of this organism are very resistant to the forces we usually consider of high disinfecting power. In 1937 the United States Bureau of Animal Industry stated, "Certain strains of *Erysipelothrix rhusiopathiae* can survive and even multiply in concentrations of phenol that are bacteriostatic to bacteriocidal to many other micro-organisms." It has been known to survive in meat pickle for over 170 days.

The diagnosis of swine erysipelas is not always easy, even by experienced men. It is often hard to differentiate from hog cholera. In these cases certain laboratory tests are of great value in assisting to arrive at an early and accurate diagnosis.

In an acute form of the disease, high temperature and loss of appetite occurs, and sometimes sudden deaths. A stiff gait and arched back are very common. Animals want to retire into the beds and if disturbed start off with difficulty but they are usually more active when disturbed than are animals affected with hog cholera and they are more inclined to eat, although the appetite may be very fickle.

Some individuals will recover completely but many are left crippled with chronic arthritis as manifested by swollen hocks, knees or ankles or by evidences of great pain on movement, so that many hog men remark that their pigs seem to have rheumatism. Many of these animals suffer heart lesions and general body weakness so spend most of the time in a recumbent position. Some develop necrotic areas of skin so that tips or rims of ears, and pieces of hide fall off or crack open and become chronic sores. In the chronic form swollen joints may occur in animals with no history of passing through the acute stage of erysipelas. There is one form of erysipelas in which diamond-shaped areas of dark red or purple skin appear. These are irregular in size and shape and are usually called "diamond skin" disease by hog men.

Autopsies of animals dead of erysipelas reveal congestion of about all the internal organs, but these are extremely difficult to

distinguish from those commonly found in hog cholera except when heart lesions are found. These include both dilatation of the heart, thickening of the valves in many cases and endocarditis marked by new growths on the heart lining very frequently.

When trained veterinarians admit difficulty in making positive diagnosis of this disease in the field it is obvious that herd owners should not attempt to settle the problem but should call a veterinarian at once when his suspicions are aroused and if he is confused request prompt investigation by some laboratory capable of making a differential diagnosis between erysipelas and hog cholera. It is important to know early, especially in acute outbreaks if it is hog cholera or erysipelas that you have to deal with. There is no medicine of any value in the treatment of either disease. Antierysipelas serum is of marked value in the treatment of the acute form of erysipelas when used early. Many times within a few hours, after it is applied, marked improvement is noticeable in the ailing animal. Healthy animals should be removed from the center of infection at once. Give serum to visibly affected animals at once which are not too far gone, leaving the judgment of this to an experienced veterinarian. Those with chronic forms of the disease had best be killed for they rarely make profitable animals and are a continued source of infection of the soil. Dead animals should be burned or buried deeply in quicklime to kill all organisms possible. Infected equipment, houses, etc., should be scrubbed, cleaned, scalded and disinfected thoroughly.

Remember that uncooked pork scraps may be a source of infection for this organism. Soil infection plays an important part in the carry-over so remove healthy animals to clean ground and start a system of cultivation and crop rotation of the old land, exposure to sunlight and drying when it is possible.

In some areas of Nebraska where hog raising was continuously unprofitable due to infection with erysipelas, a process of double treatment or the use of antierysipelas serum along with a dose of pure cultures of the organism has been used on healthy swine experimentally. This is much the same as the double treatment for hog cholera but is being done under the strict supervision of the State Sanitary authorities and under the greatest of care to prevent contamination of clothing or instruments of attendants who may later visit other places inhabited by hogs and is an experiment.

It has made possible the raising of hogs on some farms where

previously it had been practically impossible. This process should never be used in any area except where the disease is not already wide spread for it is not the best solution from the sanitary standpoint.

Experience emphasizes the fact that the losses which this disease produces are by no means limited to the deaths resulting from it, but in addition it leaves a long list of crippled animals that become spreaders of the disease and are in themselves unprofitable animals to own. In addition land contaminated by these organisms may produce corn in abundance but have no assurance that it can be fed on that land to swine unless they are protected against erysipelas by some artificial process.

Other animals including man are susceptible to this infection so be careful when working with animals suspected of infection with erysipelas.

Milk Fast

"Don't dawdle when milking" has always been good advice to hand milkers, for cows milked rapidly and at uniform speed give more milk. It's good advice when you use a milking machine, too. Tests at Geneva Station show that milk production was maintained throughout the lactation period more uniformly when cows were machine milked in four or five minutes, than when machine milked for nine or ten minutes per cow.

In a few words, the results indicate that milking machines should be removed promptly after the cow has been milked, and that cows can be trained to milk out rapidly without a lot of hand stripping. One operator with two single units should milk twenty cows an hour.

—*Farm Journal*

They Pasture the Orchard

Condensed from Pacific Rural Press

John E. Pickett

THERE are orchardists throughout California who maintain a permanent cover crop in orchards and graze it with animals, sheep or hogs mostly.

In these defense days when the problem of a farmer is to produce more food with less labor, this plan takes on new interest.

In the instances below we report on some of these orchards, and give details of the plan, but here to whet interest, let's summarize some of the conclusions as follows:

Pasturing the Orchard

Usually this plan requires more irrigation water, but often there is faster water penetration, and the time of irrigating is reduced.

It does away with the labor of cultivating.

Irrigation borders are more or less permanent.

The animals eat the cull fruit and reduce disease troubles of the trees.

Production of the tree is increased.

Pruning costs are sometimes reduced—the animals keep down suckers and trim lower limbs by browsing.

Often the animals can be counted upon to make a profit when fruit returns red ink.

Near Healdsburg Mrs. W. H. Calhoun carries on such a program. There are 18 acres of prunes which have a good looking pasture of Ladino clover and Kentucky bluegrass. Here fattening lambs and breeding ewes get a lot of feed. The orchard pasture was originally started with rye grass in Ladino, but rye grass tends to grow in bunches, and has sharp stalks which bruise falling prunes. Bluegrass has none of that fault. Under the trees the bluegrass makes a carpet and between the trees Ladino clover is most in evidence.

Before harvest time for the prunes the sheep are concentrated to graze it down rather closely. W. Raymond Collins, the foreman, who has been on the place for years, finds that the pasture doesn't interfere particularly with the picking of the prunes.

The ranch also grows alfalfa, and has some Ladino which is not grown in the orchard. So the sheep can be turned off the orchard pasture at the right time for harvesting.

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The Ladino responds best to irrigation about every two weeks, but up to late June the irrigation system—portable sprinkler pipes—had not been put in operation this year, and the pasture was doing very well. Very few weeds show in this pasture.

Last year there was some question as to whether the permanent pasture increased brown rot of the prunes, but this year Mr. Collins finds that brown rot is no more prevalent there than elsewhere.

The prune trees look fine. It seems very obvious that the sheep don't hurt them a bit, and the return from the sheep is sometimes very helpful when the prune money is slim.

Many of the pioneers in this practice are to be found in Mendocino county where hogs and sheep in prunes and pear orchards are "lifesavers."

C. R. Yarbrough, near Ukiah, has been growing Ladino and orchard and rye grass in his pears for some six years, running as many as 250 hogs on 100 acres with grain to piece out the pasture feed. He irrigates about twice a year. He says the hogs have been his insurance.

In spraying pears for codling moth, there is some danger of sheep getting too much lead arsenate which settles on the grass. Growers find that hogs, which are more tolerant of the poison, are a good substitute for sheep when it comes to spray time. They are also a little better at clean up of the cull and mummied prunes, and contribute to the health of the orchard by being better scavengers than sheep.

Professor C. S. Myszka, the farm advisor, who has been making a study of this practice for a number of years, checked with growers in the northwest who pasture their orchards, and says that the use of hogs where there is any danger of spray poisoning is to be advised.

One of the best examples of the value of making partners of livestock and fruit is A. F. Whittaker, of Potter Valley. Mr. Whittaker has kept rather exact cost figures in connection with the Agricultural Extension Service. Before he started his permanent cover crop pasture program, it sometimes took as long as 120 hours to irrigate his rather tight soil. Now he can get penetration in as short as six hours. The cost of cultivation, of course, has been cut to zero.

Yields of pears have gone steadily upward ever since he began pasturing this 3-acre pear orchard in 1934. Jumping from around 18 tons in 1933, the three acres yielded a little over 87 tons in 1939. The yield in 1940 was not quite so high—66 tons—which is about the average of the last six years.

His plan is to irrigate 3 times a year. The cost is about $5.50 per acre. If he didn't pasture he probably would save $2 per acre on irrigation. But he gets a nice return on his animals, turning sheep in early in the season, and switching to hogs when spray season is on. He sprays for codling moth only 3 times, and has no worm troubles. The clean-up by the hogs helped in this.

He finds he doesn't prune quite so heavily. The sheep keep off a lot of the suckers.

There are 22 pear orchards in this county on which impartial cost accounting studies have been kept. And Mr. Whittaker's orchard is the most profitable of them all.

Alex Thomas has about 200 hogs running on Ladino in pears. No injury to the trees. Certainly none to the hogs. They thrive on it.

These Mendocino county farmers have discovered one thing about Ladino, which has been found in other parts of the state. Ladino requires frequent irrigations to keep it as green and thrifty looking as water cress. But it will stand a lot of punishment. Allowing it to dry out will sometimes reduce bacterial troubles.

There can be no argument that a permanent cover crop in an orchard adds to the draft on the soil moisture. It requires more irrigation. Often in the Mendocino county experience that has been a good thing. Orchards which were being dry farmed stepped up production of fruit materially when irrigation began.

Red spider troubles are sometimes reduced by the more moist conditions of a permanent cover crop, frequently irrigated. The spider likes the going to be dry and dusty.

As you go around the state and find in various regions farmers who are pasturing their orchards, and are well satisfied with the results, you wonder why it does not happen in every orchard.

Hunger Signs in Crops

A Symposium Published by The American Society of Agronomy and The National Fertilizer Association, Washington, D. C.

Foreword by Gove Hambidge

WHEN we human beings lack certain essential nutritive elements, we get serious nutritional diseases—rickets from lack of calcium, phosphorus, and vitamin D; nutritional anemia from a lack of iron; beriberi from a lack of thiamin; pellagra from a lack, probably, of nicotinic acid; scurvy from a lack of ascorbic acid; and so on through a considerable list. The symptoms of these diseases are pretty clearly recognized by physicians.

Even when there is no acute disease, an essential nutritive element may be sufficiently lacking to give us a borderline case—some minor but perhaps troublesome ailment that keeps us from being really healthy. Frequently these borderline ailments too can be diagnosed by the shrewd eye of the physician, sometimes supplemented by laboratory tests.

Much of this knowledge is new, and it is of untold value. It means that many human ills—even many untimely deaths—can now be considered absolutely needless; much of our common inability to meet the demands of life with full nervous and physical vigor can be eliminated.

Best of all, we do not have to depend on the physician to achieve these things for us. As the modern knowledge of nutrition spreads, anyone who will take the trouble to understand and use it has the control of life and health, in so far as they are affected by food, within his own hands.

At the same time, the farmers are now better able to feed their live-stock for maximum health and productiveness because knowledge of human and animal nutrition have advanced together.

What has all this to do with the subject of fertilizers and crop plants?

There is a close connection in more ways than one. Plants, too, are living things. They take in food and convert it into body tissues and energy; they can be healthy and vigorous or they can be ill and die; they have their acute diseases and their minor ailments; and they require nutritive elements just as surely as do we human beings. Many of these elements, in fact, are the same ones we require. Without them,

Reprinted by permission from the book "Hunger Signs in Crops"

the plant, too, suffers from hidden hunger. It needs a balanced diet as much as we do.

You cannot tell a plant to stick out its tongue and say "Ah," but there are other ways of examining it for symptoms of ill health. It may show unmistakable signs of hidden hunger—nutritional deficiency—if we can only recognize them.

The purpose of this book is to help us to recognize the signs of nutritional deficiency in crop plants. It was written by scientists who have made a close study of the subject, each in his own particular field, for many years.

As in the case of human nutrition, the best thing about this knowledge is that it is not all in the hands of experts; it can be used by the layman. The farmer who will take the trouble to study the symptoms of malnutrition in plants is in a position, in many cases, to correct the difficulties himself.

Much of this knowledge also is new. A few years ago, for instance, what farmers called "firing" of corn was attributed to drought. Now it is known that though firing of corn is made worse by lack of moisture, it is fundamentally due to nutritional deficiencies—shortage of essential elements in the food supply of the plant.

And just as one nutritional element after another was found to be vitally necessary for human health, so one element after another was found to be essential for the health of plants. There is a real parallel between the discoveries in these two fields.

After it was found that lack of one or another plantfood could cause definite nutritional diseases in plants, the next step was to make a close study of the symptoms. A number of scientists have been doing this in the United States and other parts of the world for many different kinds of plants and many plantfoods. They have used field studies, plot studies, and nutrient-solution studies.

The work requires great patience and a close knowledge of what the plant is like in normal health. The scientist notes down every visible effect or symptom in a plant deprived of this or that element, being careful not to be fooled by something that is not a symptom. Then he tries to put the complicated lot of symptoms into some order and describe them with the utmost accuracy so they will be understandable and useful in diagnosis.

That is what has been done in this book for a considerable number of important crops.

Some of the chapters include a key for quickly identifying a deficiency by its symptoms. (These keys are arranged in the form sometimes used for plant identi-

fication, with all coordinate headings marked by the same letter, rather than in ordinary outline form.) There is also a wealth of illustrations in color and in black and white. With the accompanying legends, they are intended to tell as complete a story as possible by themselves.

This book is not to be considered the final word by any means. Active work is still going on in this field, and much remains to be done. The reader will note, for instance, that there is not as complete or as definite information about all deficiencies in some crops as in others — sometimes because of inherent difficulties, sometimes because less research work has been done in the latter cases.

Thus, the farmer will need to use caution in diagnosing deficiency symptoms, and where there are uncertainties he will want to get expert help from scientific workers. He should be especially careful about confusing deficiency symptoms with conditions due to disease, organisms, insects, or other causes.

In a few cases, injuries caused by excess of certain elements are mentioned in the text or illustrated in figures, but no attempt has been made to cover this subject systematically.

Now a brief account of how the book came to be written.

Early in 1936, The American Society of Agronomy felt that enough is known about the symptoms of malnutrition in plants—though there is much yet to be discovered—to prepare a monograph on the subject, and that such a monograph would fill a growing need. The Committee on Fertilizers, headed by R. M. Salter, appointed a subcommittee to look into the possibilities, with J. E. McMurtrey, Jr., as chairman. As a first step, this group got the assistance of the Plant-food Research Committee of The National Fertilizer Association in rounding up all available colored photographs of malnutrition symptoms, and these were exhibited at the 1936 meeting of the Society of Agronomy.

Early in 1937, plans were outlined for the Book, Hunger Signs in Crops, and the authors were selected. A major problem from a practical standpoint was to keep the price from being prohibitive; it would be very high for a small edition of a book with as many colored illustrations as were needed in this case to give maximum usefulness. However, the authors, as members of The American Society of Agronomy, contributed their work without compensation; Charles J. Brand and H. R. Smalley contributed much time and effort that would ordinarily have been part of overhead expenses; and the National Fertilizer Association, through its Soil Improve-

ment Committee, agreed to be responsible for the sale of enough copies, in addition to ordinary demand, to make a fairly large printing possible and thus materially reduce the cost per copy. (While these acknowledgments are being made, credit should also be given to Marion J. Drown for a great deal of detailed editorial work on the chapters, and to Mary A. Bradley for indexing.)

So wide a range of material on malnutrition symptoms in plants has not before been brought together in a single volume, and should be useful alike to farmers, students and teachers of agriculture, technical workers and everyone concerned with the proper management of soil and crops. Care has been taken to keep the book as non-technical as possible so as to give it wider usefulness. Even the usual lengthy bibliographies have been cut down to a few references. Fertilizer analyses, however, appear throughout the book in the technical form. This is so familiar to farmers and others concerned with agriculture that it hardly needs explanation. In such an analysis (4-10-6, for example) the first figure stands for the percentage of nitrogen (N) in the total mixture, the second for the percentage of available phosphoric acid (P_2O_5), and the third for the percentage of available potash (K_2O).

The editor would be remiss if he did not emphasize one other reason why he thinks the book is important aside from the main point, which, of course, is its immediate practical value. It marks one more step in the study of nutrition from the soil on up through man. What the soil does not have, plants will not get, and animals and men will lack also. The welfare of man is intimately bound up with the welfare of soils and plants because all our food comes in the first instance from plants; even our meat, milk, eggs, and fish are simply plant substances rebuilt into other forms.

There is a vastly significant story here which we can see as yet only in dim outline. Much more will be heard about it as time goes on, and everything that will help to fill in the many gaps in the story is a contribution to human welfare.

***HUNGER SIGNS IN CROPS** is one of the most outstanding books published in the farming field this year. It is clearly and simply written, beautifully illustrated in color, and full of facts which no farmer can afford to miss. The small investment of $2.50 for this book will return to the investor a hundred fold in knowledge.*

Why Do They Need Salt?

Condensed from Eastern States Cooperator

R. E. Ward

THE two elements, sodium and chlorine, which together make common salt are nearly always deficient in feedstuffs used in livestock rations. These two elements are necessary for all body processes and for the digestion and assimilation of food and the excretion of waste from the body. They are supplied by feeding salt. Animals deprived of salt soon show symptoms such as a craving for salt, lowered production, weakness, lack of vitality, harsh rough hair, sluggish intestinal action, loss of weight, and finally complete breakdown followed by death. The results of slight deficiencies are not so marked, but may still cause a significant loss.

The salt requirements of poultry, turkeys, hogs, and dogs are adequately met when well balanced rations are fed and it is not necessary to feed these species additional salt except under unusual conditions. When cannibalism is starting in a flock it can sometimes be stopped by adding two or three percent additional salt to the ration for a few days. As soon as picking stops this additional salt should be discontinued. The continuous feeding of high levels of salt will not prevent cannibalism and is harmful. Occasionally sows exhibit a tendency to eat their young and additional salt for a few days may aid in overcoming this vice. As a general rule large amounts of salt should be avoided in hog rations.

With normal rations, cattle require about three-quarters of an ounce of salt for each thousand pounds liveweight per day and about one ounce for each 33 pounds of milk produced. Due to differences between cattle and the wide variations in conditions under which cattle are kept, it is not feasible to supply the optimum amount of salt to all cattle in the concentrate ration. Their requirement for salt is much higher when roughages or pasture make up the principal part of the ration and the ration then supplies only a part of the salt needed. Even under full feeding conditions, cattle differ greatly in their desire for salt. Under identical conditions of feeding and management, some cows will consume several times as much salt as others and will do better if supplied this salt.

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The salt requirements of horses, also, vary greatly because of the same conditions. In addition, horses lose large amounts of salt from the body through perspiration. Horses sweat, or perspire, over the entire body, and they sweat very freely when working hard on hot days. Each pound of this sweat contains almost 0.1 ounce of salt. Athletes sometimes lose five or six pounds as perspiration in a few hours by vigorous workouts, so it is easy to see how the daily loss from a horse may be very large. Insufficient salt is probably responsible for many heat prostrations that occur in horses.

This loss of salt through perspiration is also of importance to humans and you may find additional salt helpful during summer.

Cattle and horses are able to determine their own requirements for salt. No harm and much benefit will result by allowing them free access to it unless they have been deprived of salt for some time. In this latter case, salt should be fed carefully at first as some may consume enough to cause sickness or death.

The cost of salt is very small compared with the cost of the rest of the ration, but it is a big factor in obtaining the most efficient use of the ration. Salting by hand once or twice a week should not be depended upon for optimum results. Dairy and beef cattle and horses should have free access daily to salt in some location where they have sufficient time to satisfy their needs.

The most satisfactory and economical method is to provide a box containing ground or flaked salt under a small roof in the pasture or barnyard. Salt blocks may also be used and will not wash away as quickly when exposed to rain, but high producing cows sometimes find it difficult to obtain sufficient salt from these blocks. Where cattle or horses are kept in the barn most of the time, the use of individual salt bricks is very satisfactory.

When a mixture of dicalcium phosphate and salt is used as a source of additional minerals, it is advisable to supply a box of plain salt in addition to this mixture. In work at Westbrook Farm, it was found that cows consumed mineralized salt bricks a little faster than plain salt bricks, but they apparently obtained all the salt needed from the plain salt bricks and no benefit was observed from the use of mineralized bricks. Iodized salt is used in iodine deficient areas.

Portable Lumber Harvester

Condensed from The Ohio Farmer

ONE of the innovations that has come to Ohio farms in recent months is a new type portable sawmill operating on the farm woodland, much in the manner in which a threshing machine or hay baler moves in to do a custom job at harvest time.

The machine which makes this type of custom sawing a practical, everyday job is one of about four that have been designed and custom-built in Wisconsin.

This portable sawmill was exhibited in operation at the Ohio State Fair, in August. It sawed Ohio-grown timber and the lumber was built into practical structures which could be duplicated by the average Ohio farmer with his own tools.

Involving several new mechanical features, the machine has been designed to do a good job of sawing. Being light in weight it is quickly and easily set up. The entire portable mill and trailer weigh only two tons. In 30 minutes it can be set up ready to operate, and in 15 minutes it can be dismantled and made ready to move.

Experienced lumber experts have inspected its work and say that it will saw to dimension as closely as the average stationary mill set-up. It will cut from three to five thousand feet of lumber a day under ordinary conditions.

Oliver Diller, associate forester of Ohio, saw the mill in operation in Wisconsin and was quick to realize its possibilities for practical use in Ohio farm woods. He arranged for a demonstration of the outfit in Ohio, and three graduate foresters jointly purchased the machine and put it to work.

Under the old methods farmers were obliged to cut their logs, transport them to a mill perhaps several miles away, wait for an indefinite period for the sawyer to get the job done, and then haul the sawed lumber several miles back home. In the majority of cases he left the slabs from his logs at the mill, when he might have been able to use them for fire wood. With the portable mill he merely drags his logs to the edge of his woods, the machine pulls in, does the job, and pulls away; and the farmer can use his lumber the same day if he wishes.

Diller believes that it will be much easier to interest the average farmer in a good woodlot

Reprinted by permission from The Ohio Farmer, Cleveland, Ohio, July 26, 1941

management program when these portable mills come into general use. In several of the woodlots where the management has been operating, only the decadent or dead timber has been removed for sawing, leaving the thrifty younger trees for further growth and development. He is convinced that if the average farmer will intelligently manage his woods, protect it from fire and livestock grazing, he will soon realize that his woods will yield him a continuous supply of rough lumber for general use about the farm. In a number of cases where accurate records have been kept, farm woodlots have yielded from $8 to $10 a year per acre in net returns.

Only four men are needed to operate the entire mill set-up, which is equipped with an electric receder and other interesting gadgets. Entirely mounted on rubber, the outfit can be moved easily at 30 miles an hour on the highway.

Sinox for Weed Killing

Startling results were secured from sinox (by-product of the dye industry) in controlling fanweed (also known as French weed) on spring wheat and barley in Nez Perce County, Idaho, in 1940.

One treated patch of spring wheat averaged 24.9 bushels per acre; an adjoining untreated plot infested with fanweed yielded 10.5 bushels. In another test, treated wheat yielded 19.3 bushels; untreated, 10.1 bushels.

A treated plot of spring barley produced 53.7 bushels per acre; an adjoining untreated plot, 27.5 bushels. In another test, a treated field produced 39.3 bushels per acre; untreated, 31.0 bushels.

—*Farm Journal*

The Bureau of Agricultural Economics

THE Bureau of Agricultural Economics is charged with the responsibility of carrying out two very different jobs. Both are of help to farmers, but one is more concrete than the other. On the one hand, the Bureau is the Department of Agriculture's economic fact-finding instrument in the innumerable problems of agricultural production and distribution. On the other hand, it is also the general planning agency of the Department.

Reorganization of the Department of Agriculture along certain lines, took place three years ago, at the direction of the Secretary of Agriculture. To strengthen relationships with the States was one of the chief aims. To provide machinery that will encourage farmers to take an active part in group planning for improvements for their farms and communities was another. To formulate with them, definite programs for advancement and to coordinate these programs was another aim. All of these programs made in and by the Department were to be more closely inter-related. The research, service, and regulatory work was to continue as before and be given all practicable encouragement.

Commodity divisions of the Bureau of Agricultural Economics, well known by farmers, were moved to the newly formed Agricultural Marketing Service. Many other lines of research remained in this Bureau and have been actively carried forward. They are reviewed briefly here.

Management of Farms

Types of research carried out by the Bureau are many. One aimed toward obtaining income parity for farmers, necessitates a careful determination of income, both agricultural and non-agricultural. Another is in the field of farm management. Here the research is concerned with the means of increasing the income of individual farms of different types, sizes, and locations. This is the line of work that farmers all over the country see and know about, for many farms have been studied at first hand. As the family-sized, individually-operated farm is the most important producing unit in American agriculture, satisfactory incomes on family-sized farms in different areas are necessary to general farm prosperity.

Helps in Rehabilitation

One specific way in which results of these studies are put to work is in the extensive rehabili-

tation program going forward under the loan system of the Farm Security Administration. It demands much basic information regarding the conditions under which farmers can re-establish themselves on a self-supporting basis. Farm-management studies often give the answer to questions as to size and type of business on which rehabilitation clients have the best chance to succeed.

Marketing Improvement

Work relating to marketing, demand, and distribution is always of vital interest to farmers. Good marketing conditions often mean real money to them. Research brings findings whose application helps to make our marketing machinery more efficient by reducing costs and wastes. This research helps in maintaining a freely competitive market in which supplies can be quickly shifted and in which prices can be quickly adjusted to meet changes in the economic situation. The new market place in Kansas City is partly an outcome of the studies. So is the new market about to be built in Atlanta. Specific recommendations regarding markets in New York City and Philadelphia have been made to those cities, on request.

Farm Risk Insurance

Natural and unavoidable farm risks worry all farmers. Their cost and the possibilities of lessening the burden of them by some form of insurance are being closely weighed, based on critical research. Crop insurance on wheat is now in operation; Congress has recently provided for insurance on cotton and the Bureau is shaping the results of its studies toward the operation of the plan. Possibilities in regard to citrus fruits, corn, tobacco, and rice are under study.

Pinning Down Results

For years the Bureau has been strengthening and inter-relating its research and information service. One concrete outcome is the detailed yearly statement of the market outlook for each farm product during the coming season, with later reports on the agricultural outlook each fall and spring, and current statements reviewing the position, with respect to prices and supplies, of all important farm products.

Clarifying Farm Problems

Other lines of work are not so obviously of practical and immediate use to farmers but they lead to better conditions or understanding of facts. The direction, quality, and quantity of migration to and from farms is considered a measurement of rural economic and social conditions at any given time. These movements are measured annually in order to have this important index of the relative well-being of the people engaged in farming.

Studies are made of farm labor problems, covering typical agricultural areas. The underlying conditions affecting the supply and demand of farm labor, as well as wages and living conditions are learned. The conditions of the workers who are commonly regarded as on the lowest rung of the agricultural ladder are scrutinized particularly. The findings may pave the way for better adjustments.

All the facts about farm-mortgage credit—amount outstanding, sources, rates, etc., as well as the desirability and costs of such credit—have been brought together and analyzed. Similar information with regard to production credit, rehabilitation credit, and stabilization credit is being compiled. Extensive reports are being prepared. Taxation in its various phases as they affect farmers is another line of agricultural finance that is studied from several angles. These activities give a sound basis for later improvements.

Statistics Are Basic

Statistical research is basic to all interpretations of studies and to national programs to aid agriculture. A multitude of facts, especially about the movements of prices and related supply-and-demand facts, and an understanding of the relationship between these economic forces, are essential if farm programs are to be effectively planned and administered.

Not many years ago people had conflicting ideas about what makes prices of commodities move up and down, the effects of tariff rates, and the relations between many general economic facts that enter decisively into the incomes received by farmers. Partly as a result of painstaking statistical research carried on for many years, definite and reliable answers to many of these problems are now available.

New Directions

Old friends of the Bureau probably know a good deal about these lines of research. Tangible benefits have been recognized on many farms or in communities. The newer lines, introduced or stimulated by the reorganization made three years ago, may not be so well known. They center around the idea of planning for the agricultural future. Farmers are learning about these lines of work through the new country planning committees. The Bureau's duties in relation to these newer lines are to act as a general planning and program-making agency for the Department, and to encourage farm people to work out agricultural programs and policies for themselves and their communities.

Local People Plan

In line with this duty, the Bureau collects and coordinates agri-

cultural information from farmer groups, State agricultural colleges, and other research institutions regarding the possibilities of long-time economic planning in counties or regions. It works with local farmer or regional groups and authorities to stimulate the adoption of sound agricultural programs. The aim is the ultimate adjustment by the farmers themselves of the Nation's agricultural economy on the basis of the greatest long-time benefit to themselves and the country.

To accomplish these ends the Bureau maintains a representative, located usually at the College of Agriculture in each State, who helps the State to coordinate all agricultural plans. He serves as the executive secretary of the State agricultural planning committee, and through the Extension Service and other local agencies he works directly with the farmers in each county as rapidly as this can be brought about. Constant cooperation is maintained with the State college and authorities. As the county committees, composed of farmers and other rural leaders, shape up their local programs, the State planning committee tries to develop these into a harmonious State program. The Bureau of Agricultural Economics keeps in mind the possibility of eventually inter-relating these into a program for the country as a whole.

Strengthened Relationships

This county program planning by farmers is a significant development in the modern relationship between Government and farmers—local, State, and Federal Government. It may gradually provide a truly democratic machinery by which the agricultural industry can plan and carry through its own wishes for its welfare and the welfare of the country.

In cooperation with the operating agencies of the Department, the Bureau is working toward efficient recommendations for watersheds, for type-of-farming regions, and for other kindred areas, as guides for satisfactory development.

Using Land Well

Perhaps the best known of the new lines—a direct outgrowth of land research which the Bureau has been doing for many years—is its extensive land economics and utilization work. This includes research in the development of more desirable patterns of land settlement and use. The Bureau analyzes economic and social backgrounds and maladjusted land areas, and works out recommended programs of rehabilitation and adjustment. These can be put into practice by the purchase of submarginal land, through cooperation with State and local agencies. Together these agencies formulate recommended

programs relating to all the uses of the land, involving forestry, soil conservation, farm tenancy, rural rehabilitation, or any agricultural or grazing lands. These proposed programs are submitted to the Agricultural Program Board of the Department of Agriculture for consideration and possible action.

Closely related, is the study of water utilization. Extensive surveys have been made of the conditions under which water development and use have taken place, particularly as they affect irrigation, draining, and availability of water for livestock in the western Plains. The Water Facilities Act of 1937 gave the Bureau certain responsibilities in making recommendations for efficient development of water.

Summarizing, it is repeated that many lines of its work are of an over-all nature in which results may not be evident for a long time, but effort is made to pin them down to practical considerations and to aim toward as early results for farm families and their communities as practicable. Many other lines of work are of immediate dollars - and - cents value, as when the Bureau is able to make specific recommendations regarding farm practices in certain localities, can ferret out and make known to farmers certain decided changes in demand and supplies, and can recommend specific changes and improvements in city markets for farm products.

A Run-Down Farm Reclaimed

Condensed from Pennsylvania Farmer

HOW an 88-acre farm which 25 years ago would not produce enough hay and pasture for 15 cows now feeds 60 pure-bred Ayrshires has been the subject of much interest to practical dairymen and agronomists, in late years. The farm is located in Franklin County, Pennsylvania, and is owned by Wilbur F. Barkdoll, Master Farmer. Many changes have taken place in the transformation of a neglected and run-down farm into an establishment noted for the excellence of its output and the efficiency of its management.

In 1915 the Barkdoll farm was divided into 10 small fields separated by generous fence rows—more admirable as game cover than as farm boundaries. The house and barn were in fair condition; the outbuildings could with charity be called poor. Now alfalfa, orchard grass and Ladino clover grow to the edge of neatly fenced fields rearranged to fit soil-building and crop-improving rotations. The house and barn have been brought up to date; small outbuildings "liquidated" or improved.

The Barkdoll system is based on growing things; on the use and not the abuse of the soil; on making the most of grass, and banking on blood in dairy stock. The hay crop on his farm in 1915 was six four-horse loads. Wheat yielded 15 bushels per acre; corn 75 bushels of ears. This summer the first cutting of one field of alfalfa, orchard grass and Ladino clover ran just under two tons per acre in spite of the dry spring, and a few weeks later the cows in pasture on the field were up to their eyes in lush feed.

What lime, legumes, manure and commercial fertilizer will do for neglected land is shown by the fact yields in late years have run as high as 45½ bushels of wheat per acre, 198 bushels of ear corn, 7½ tons alfalfa, 21½ tons of corn silage and 24.6 tons green matter on pasture. Analysis of the latter showed it contained 17.3 per cent protein—a kind of feed which will make a lot of milk. In comparison with the six four-horse loads of hay in 1915 in a recent year the hay crop amounted to 131 four-horse loads.

The livestock population of the place at present is six horses, 40 milk cows, 18 heifers, two bulls and 75 chickens. In 1935 some

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710 loads of manure were spread on the land; in 1939 the amount was 783 loads.

Mr. Barkdoll has two rotations, one of three years, the other of five. The first is corn, wheat and grass (and legumes); the second is the same with more grass. That is, he crops and pastures the hay field three years instead of one. This provides flexibility in case of drouth or other cause of crop failure. The corn is checked with four stalks to the hill. Wheat is seeded at the rate of three pecks per acre. The pasture mixture is 14 pounds orchard grass, 12 pounds alfalfa and one pound Ladino clover, seeded in the spring. In case of the five-year rotation alfalfa is sown in wheat in spring at the rate of 18 pounds per acre and the second year this alfalfa is top-dressed with manure reinforced with 250 pounds of 20 per cent superphosphate per acre.

The soil-building program in the beginning started with lime. Hydrated, marl and limestone dust were used, slightly more than requirements. Mr. Barkdoll was the first man in his county to use marl. The fertilizer was 250 pounds per acre of a 3-12-5 mixture. Later as the land grew richer the commercial fertilizer treatment has been 200 pounds per acre of 20 per cent superphosphate drilled with the corn, 200 pounds of the same on wheat and another 200 pounds when alfalfa is seeded. Manure goes on all grass after grain is removed, on permanent pasture and on alfalfa.

Power Weed Burner

Condensed from The Reclamation Era

L. R. Fiock

Superintendent Rio Grande Project

AN endeavor to obtain equipment for weed burning which would speed up operations, burn cheaper oil, and be more generally adaptable than equipment heretofore used on the Rio Grande project, has resulted in the development of a portable power unit which is accomplishing these objectives.

Previously we had tried every make of hand burner, with fuel tank carried by the operator, that came to our attention. At present we have on hand a large number of the less expensive ones, which seem to be better adapted to our weed-burning work than the heavier more expensive makes. These burners have been of the so-called generating type, having a heating coil to generate vapor or gas. Such burners require distilled fuels, such as distillate, kerosene, gasoline, or mixtures of these fuels which cost from 8 to 12 cents per gallon.

Our burning operations for many years were conducted mostly for the fall and winter clean-up of dry weeds on canal banks. In 1939, however, when a weed-control project was organized, we began the searing of green weeds. Hand burners were used for this work and the progress per burner was rather slow.

Toward the end of the season an orchard spray outfit, originally acquired for experimenting with chemicals and oil, was put into use as a burner. Better progress was made with this outfit but since it was bulky, it required a 1½-ton truck to transport it and it also proved very wasteful of fuel.

Having had some first-hand experience with the installation and operation of a house-heating oil burner unit, which uses fuel oil from 28 to 32 gravity costing from 3½ to 5 cents per gallon, the idea occurred to us that this type of equipment might be adapted to weed burning. Thus, the latter part of 1939 work was undertaken to convert one of these units into a weed burner, using all parts down to the burner nozzle except the ignition system, blower, and electric motor.

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The weed burner developed comprises the fuel system, pump, strainer, regulating valves, and nozzle from a model D-44 Delco oil burner (designed for house-heating furnace), operated by a Lauson ¾-horsepower gasoline engine. Pump, strainer, regulating valves with pressure gage, and engine are compactly mounted on a steel plate base with pump shaft directly connected to the engine shaft by a flexible jaw-type coupling. This unit with a 30- to 50-gallon tank is mounted on a 2-wheeled cart made from the front axle of an automobile, the axle being shortened to produce an overall width, outside of wheels, of 4 feet. The outfit can thus be hauled in a pick-up truck or towed by an automobile on wide canal banks or drawn by hand on canal banks too narrow for truck or car travel.

The capacity of this equipment is sufficient to operate two burners, one on each bank of small laterals or both on the same bank of large canals. The fuel oil is atomized at the nozzle by high pressure (175 to 200 pounds) instead of being vaporized as in the generating type of burner. The nozzles are connected at the end of a straight piece of ¼-inch pipe 10 feet long, which is attached to the pump by 40 feet of ¼-inch high pressure hose. Experimenting is now under way in the use of coils to preheat the oil before it gets to the nozzle, and results so far indicate that this gives increased efficiency.

The size of the flame and amount of fuel used are not adjustable during operation. These are controlled by the size of opening in the nozzle. Various sized nozzles giving narrow, medium or wide angle of spray or flame, can be obtained. We have been using a wide angle 10 gallon-per-hour nozzle for low weed growth and a 12 gallon-per-hour nozzle for high weed growth. These ratings are at 100 pounds pressure. At 175 pounds pressure about 12.5 and 14.5 gallons per hour is used. The size of nozzle to use may best be determined by trial. The most economical size is one which will keep the operator moving along at a normal pace and yet not waste fuel.

The oil used for this burner on the Rio Grande project is Diesel engine fuel, as it can be most conveniently obtained. It can be purchased in tank-car lots and stored in and drawn from the same storage tank as the fuel for tractor and excavating - machine engines.

A portable 2-burner power unit, such as has been described here, can be built for about $140. Costs of parts and labor are approximately as follows: Delco burner parts and gage $46.22; Lauson engine $30; hose $14.15; material for cart (mostly salv-

age) $18; miscellaneous (pipe, couplings, tank, etc.,) $16.11; and labor $18.

A comparison of results in weed burning operations with this portable power burner unit (two burners) with hand burners, indicates that 5 men with power burners can accomplish as much as 10 men with hand burners. In burning operations with the portable power unit, 2 men operate the burners, 2 pull the cart, and 1 fills the tank and changes off with the others. The fuel cost per mile of canal bank with power burners was $1.80; with hand burners it was $4.06.

Summer-Seeded Oats

Oats seeded in late summer provided some of the best fall pastures Earl Parnell ever produced on the farm he operates in Jefferson county, Kansas. "They were drilled on a field that had been in second-year sweet clover," he said. "I disked the ground after the clover was too mature for pasture, then drilled oats after a good rain that soaked the soil. The oats germinated at once, made rapid growth and provided more grazing than I needed. Many patches headed. However, it is not possible to seed as early in some years, for it is no use to seed oats in late summer unless soil moisture is sufficient to carry the crop until fall rains start."

—*Cappers Farmer*

Mink as a Sideline

Condensed from New England Homestead

Florence C. Arms

FARMERS' wives, looking for a sideline with which to make money, should contact Mrs. E. L. Ford, of Woodbine Farm, Charlotte, Vt. Her financial philosophy is working out successfully, bringing her a larger revenue than many of her neighbors receive from their main endeavors.

"If you must have money weekly, then chickens are best, because you can get cash every week for eggs and broilers. On most New England farms the monthly milk check is the most important source of income. But if you can wait a whole year, the largest returns on your money come from breeding mink."

Mr. and Mrs. Ford came to Vermont a few years ago from Denver, Colo., buying the former home of Mrs. Ford's great-grandfather, Joseph Jones, in Charlotte. Mr. Ford is eastern division manager for Pontiacs in General Motors, so Mrs. Ford's job is to run the mink ranch and look after the poultry plant, which they are enlarging this year.

This is her third year in mink raising, and last December all her pelts marketed at the New York fur auctions rated as "supers"—meaning they were of extra fine quality and sold for $16.00 to $18.00 apiece, less the 5% fee charged by the auction companies as a selling commission. A surprising amount of service is included in this fee—grading, storing and handling the farmers' peltries while they are in New York, and selling them at the most advantageous time. Some fur farmers ship direct to manufacturers, but New York fur auction houses are the largest in the world and buyers flock there in the fall.

Some idea of the different grades of mink and their value is given by the following report of last winter's auctions. Ranch mink taken in the prime, is really the finest of all mink, because it has the best underfur. Wild mink are seldom killed in the prime. Japanese mink is not pure mink; it's a form of weasel. Blended mink furs are dyed, and in two or three years the dye will wear off. Dark males bring the most money.

Wild mink brings $10.00 to $11.00 for perfect specimens and

Reprinted by permission from New England Homestead, Springfield, Mass., July 26, 1941

prices range downward according to the condition of the fur.

Most ranchers, like Mrs. Ford, divide their furs into three lots of male pelts and three lots of female pelts—super, medium, and poor. Lots bring the price of the worst pelt included, so it pays to be careful in the grading. A lot consists of 80 skins, that number being required to make a coat. This makes a good mink coat and costs the wearer about $1,000 to $1,500.

The climate of Vermont and other northern states is peculiarly adapted to fur farming and particularly to mink raising. There are about 200 mink farms in the state. The young are born the latter part of April or first of May, and by the middle of November some are ready to pelt. They begin to "shed out" with the first crisp days of September and October, so that Mrs. Ford has her crop ready for market five and one-half to six months after the animals begin to eat in good earnest. It costs about one and one-half cents per day per mink to feed them.

The females have to be closely watched only when the litters are due. This is a perilous time, because females frightened by smoke or any strange noise, will destroy their young.

Otherwise, keeping mink is only a matter of good housekeeping for the farm wife. These houses have to be kept clean or there is a strong, wild odor. The Fords raise alfalfa on their place and use the first cut for bedding in the nests. They know the little animals will use part of this for food.

Mrs. Ford says, "You have to take advantage of the best local food combinations available, and I follow the same vitamin chart for the mink which the Extension Service gave me for human food consumption. I try to keep my feeding room as clean and well-stocked as I do my own kitchen pantry.

"What we grow in our garden is largely determined by what the mink can use, just as much as it is by what the family likes to eat. Last year I grew tomatoes and canned 300 quarts for the mink. I also grew lettuce, carrots, spinach, cabbage, kale and broccoli for them. It takes a little better than 3 ounces per day per mink for food."

The main staple in the diet of Mrs. Ford's minks is salt water fish, which come to her packed in sealed pails, available to her at from $1.15 to $2.50 per hundred at the door. She also buys old horses when she can and these are boned out and the meat put through an electrical meat grinder and stored in an ice cream cabinet for use when needed. Usually these old horses cost from $5.00 to $10.00 apiece. Oc-

casionally, too, she buys "canners," but most of the time this is too expensive.

The vitamin chart is important, because the best underfur is obtained only with proper feeding. Vitamin E is the growth and fertility unit; Vitamin C prevents such diseases as scurvy, etc.; Vitamin D makes for bigger bone frames; Vitamin G is also a growth and weight vitamin; Vitamin A is most essential to health and growth; and Vitamin B is anti-neuritic. Wheat germ meal, Mrs. Ford's only source of Vitamin E, is bought in bulk through a local grain dealer.

Mrs. Ford started with 35 breeders; 25 females and 10 males. She has never bought in any outside stock, following a selective and line breeding program of her own. She proves out the young males that have the most size and best color of fur, mating them with the best females, which she keeps over for breeding purposes. The females usually average three and one-half litters. There may be one to 11 pups in a litter, but if there are too many it is hard for the mother mink to care for them and a large litter doesn't usually turn out so well as a medium sized one.

Mink stay in their prime only about a week, so they must be carefully watched, during November. Mrs. Ford disposes of them humanely, using a chloroform box. She could give no accurate estimate of her overhead involved, but the keeping of her mink did not run into any large amount. The mink houses are square boxes adjoining wire pens raised off the ground about three feet. Each mink requires his or her own exercise pen.

For the whole state of Vermont, the amount of money invested in real estate of fur farms, mink housing, pens and equipment is between $1,500,000 and $2,000,000, according to figures furnished by the Vermont State Marketing Bureau. Gross income in Vermont from the 1940-1941 crop of fur has been estimated at $750,000.00.

As Mrs. Ford concludes, "It makes me a tidy income. If I ever have a bad year, I'll own a nice mink coat myself, but so far it doesn't look much like it. My ambition is to own about 500 mink, and then I think I'll have the most profitable size ranch, although maybe I won't be satisfied with that and will want 2500 of them, which is about the size of the largest ranch in the state."

New Cash from Hayseed

Condensed from Farm Journal and Farmer's Wife

HAYSEED is no longer a word to make jokes about. It is a synonym for new farm dollars; and new sources of farm income are no joke. The total value of the 1940 seed crop from 20 different grass and legume hay crops (not counting soybeans, cowpeas and velvet beans) was $47,772,000. Alfalfa was first in value among them, red clover second, lespedeza third and alsike fourth.

The increase in amount of hayseed grown in the United States in the past ten years makes a good story. There's alfalfa seed—the 1940 crop was four times that of 1920 and about 20% more than the 1930 crop. Our 1940 red clover seed crop was nearly twice that of 1930—and the 1930 crop was a pretty good one. The 1940 lespedeza seed crop was three times that of 1930. Crimson clover made ten times as much last year as we harvested in 1930; meadow fescue was twice as much; Kentucky bluegrass was twice as much (though 1930 was not a big crop).

Blockade of European ports is one explanation for the bigger dollar sign that home-grown hayseed wears. Countries now under Hitler's stamp used to send us big orders of grass and clover seed. Two years ago shipments began to dwindle and now they have dried up. For nine months ending March 31, 1941 (Uncle Sam's latest figures), only 1,500,000 pounds came in. That's only about one-tenth of the average annual imports during the ten-year period 1930-1939. In one year alone (1936) we imported well over 40,000,000 pounds, including 14,000,000 pounds of red clover.

This shrinkage of imports is only part of the reason for the new meaning hayseed has taken on. For a half dozen years farm practice has been edging over toward a grassland agriculture. In place of acres of cultivated crops, farmers have seeded grass and clover under the urging of the Soil Conservation Service. This has created more of a market for grass and clover seed. At the same time grass and clover experts have been developing new strains and varieties which naturally required production of seeds. On a few seed crops, a price guarantee was established.

A complete picture, however, must also have in it a relatively

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new farm implement—the small combine. Without it, there would have been a harder pinch as hayseed requirements climbed and imports petered out. The small combine has simplified the problem of harvesting without loss of seed and with minimum of labor, particularly in the crops where a great deal of handling results in loss from shattering. Such crops as lespedeza, white clover and the like, can be harvested and threshed directly from the standing plants, from swath, or from windrow.

Boil down into farm practice all that has been said thus far, and you find a great many farmers who have fewer acres in cash-crop corn, wheat, cotton or tobacco. Acreage taken out of these crops has been put into soil-building crops, on which the government makes benefit payments. From these seeded-down acres a farmer can harvest and sell a crop of seed without losing his government soil benefit payments. Thus he has his cake and eats it, too.

As long as farming continues to move farther toward a grassland agriculture, this practice will continue. Already the hayseed crop has become an important source of farm income, spread over six months of the year, in different parts of the country. Nearly every section has been benefited.

In May, Tennessee (and Oregon in June) started harvesting a crop of crimson clover seed that looks as if it will add up to 8,360,000 pounds of clean seed—a new record. The AAA purchase program announced last October ($10 a hundred for seed germinating 85%) encouraged this. Oregon's acreage planted for seed jumped to 7,000 acres; it was 1,200 last year. Oregon yields may average 500 pounds per acre. Tennessee yields have been cut this year by drought to about half the Oregon figure.

Also in June, white clover seed harvest began in Louisiana. Yields ranging from 50 to 90 pounds per acre brought around $50 per 100 pounds. This is double the returns of three years ago. Wisconsin and Idaho white clover seed follows that of Louisiana to market. Imports of sweet clover (mostly from New Zealand) during the past year were the lowest since 1919.

July brings new cash from seed of smooth brome grass, slender wheat grass, mountain brome grass, meadow fescue, reed canary grass, crested wheat grass, orchard grass, perennial rye grass, bent grass and sweet clover. August brings timothy, alfalfa, redtop, Canada wild rye grass, big English clover, red creeping fescue. September and October bring alsike clover, red clover, little red clover, lespedeza, Hubam clover, subterranean clover and others to

harvest. Actual dates vary with season, locality, method of harvesting, and whether (as with some of the clovers) seed is taken from first or second crop.

You get a better picture of how grass seed helps farm income and how it ties in with other farm enterprises when you visit individual farms. Let's make a few flying farm calls:

On Pabst Farms (Oconomowoc, Wisconsin) last year 80 acres of bluegrass were permitted to go to seed and 10,000 pounds of rough seed combined during July. Entire cost of harvesting was $235. This cost was separated as follows: Harvester cost, $1.01 per hour; tractor cost, 40 cents per hour; man operator, 40 cents per hour; total harvesting cost per hour per outfit, $1.81.

After drying for approximately 30 days, the seed was recleaned on the farm by again running it through the combine. This reduced the 10,000 pounds to 6,500. Before marketing, the seed was cleaned by a commercial firm that has complete cleaning equipment, at a cost of $135 ($2 a hundred pounds). This reduced the total amount of seed to 5,300 pounds. Says farm manager William Doyle:

"After final cleaning the seed weighed 21 pounds to the bushel, and was sold at 16 cents a pound to a Milwaukee seed buyer. Germination test was 90%, whereas 80% is regarded as acceptable by the average seed buyer. Total proceeds of sale of seed was $853.28. Total cost of harvesting and cleaning was $360. Deducted from proceeds, this left a net profit of $493.28. After the field was harvested, it was used for pasture for 85 head of dairy cattle from July until winter."

Quite a few farmers who never harvested grass seed before have been doing so since they started using small combines. Some of them have increased their acreage of seed crops. Thus, Frank Hulen, Crestview, Tennessee, harvested seed from ten acres of crimson clover and 15 acres of lespedeza (both for seed) along with 95 acres of small grain. Clyde Wilks, Fayetteville, Tennessee, harvested seed from 35 acres of crimson clover, 8 acres of rye grass and 15 acres of lespedeza along with 65 acres of small grain. W. H. Sharp, Elizabethtown, Tennessee, combined 14,280 pounds of lespedeza seed and 800 pounds of rye grass seed—only 1,700 of small grain. Says Clifford Litton, Altona, Illinois: "I never bothered much with clover until I got a combine, and now I find it profitable to harvest."

Theodore Kramer, Jr., Round Prairie, Minnesota, who harvests reed canary grass seed with his combine, says: "It is extra income you couldn't get any other way." John Cole, Verndale, Min-

nesota, harvests alfalfa seed—fall and spring. Says he: "I've harvested 50 pounds of seed to the acre from alfalfa that was so short and thin it would have been impossible to get it in any other way. One field was left in fall because it was too thin and short to cut with mower and gather with rake. I combined 50 pounds of seed per acre from it in spring."

Custom-owned rigs have made seed crops possible on some farms. Schmidt Brothers, Clayton, Illinois, combined 20 acres of clover for a neighbor and got 24 bushels of clean seed. From another 15-acre field run through a clover huller, the neighbor got 17 bushels.

Besides pointing to new cash income, these experiences answer criticism of the combine made more than a year ago by some of the firms dealing in grass and clover seeds. They blamed the combine for poor germination (especially of timothy seed), saying the combine harvested immature seed along with ripe, and that the seed was damaged by heating after harvest. Makers of combines countered that any trouble was due to careless use of the combine, and not to the combine itself. Nobody in either camp pointed out that there had been a huge crop of timothy seed the year before, and that the germination of timothy is pretty sure to be low in a year when there is a big carry-over of old seed, especially if old seed is mixed with new.

The very economy and efficiency of the combine in harvesting seed under unfavorable conditions (lodged or tangled crops, wet ground, etc.) can result in a kickback when the combine is used without good judgment. The experience of C. N. Ayres, Mechanicsville, Iowa, is a case in point:

"Three years ago I tried to combine timothy direct from standing plants. After an hour or so the tailing auger would fill up with damp timothy seed and stems. The seed was so damp it had to be spread out on a floor and raked every so often so it would dry. I found out that if the timothy is left until it is dead ripe and ready to shatter, combining from uncut plants is successful. In case of a heavy rain, though, a lot of seed would be lost.

"The most successful way for me has been to mow it and let it lay for two days. Then I run the side rake right in front of the combine, to make a windrow the combine can pick up. By side raking just ahead of the combine there are no extra windrows that have to be turned after getting wet. I have harvested clover seed the same way—mowing, letting lay for two days, then turning into windrow just ahead of the combine."

Marketing 1,400 Turkeys at Retail

Condensed from The Rural New-Yorker

Harry L. Spooner

STARTED as an experiment in 1939 with 300 turkeys, the Pilgrim Farm, at Bartonville, Ill., of which L. T. Sprague is proprietor, last year raised and marketed 1,400 turkeys at retail. This year 2,500 are being raised at present and the proprietor is trying to secure 500 more poults.

Bartonville is a suburb of Peoria and the Pilgrim Farm is just five miles from the center of downtown Peoria. It consists of 28 acres of land beautifully rolling and covered for the most part with natural shrubbery. Five acres of this is used for the turkey range, the area being changed from year to year.

Mr. Sprague took up turkey raising as a hobby. He had definite ideas of how to market turkeys at a profit and he put these ideas into operation during his second year, after experimenting the first year.

"There may be money in wholesaling turkeys," says Mr. Sprague, "but not to compare with retailing, if the latter is done according to modern methods. However, in order to attract retail trade, the grower must have something which differs from the usual run of the mill. We have used different advertising and different refinements in preparation and packing and have proved that these differences will sell turkeys."

To properly handle the marketing of his turkeys, Mr. Sprague first gave his farm a name, Pilgrim Farm, a very appropriate name in view of the fact that the Pilgrims of New England instituted Thanksgiving Day and used wild turkeys for the principal part of the Thanksgiving dinner. Ever since then a Thanksgiving Day has not been complete without a turkey for dinner.

The Pilgrim Farm built an attractive turkey house, of haydite blocks, 80 x 20 feet. It is a two-story affair. It has smooth concrete floors and the walls are whitewashed throughout, making it a very sanitary building. During the Spring and early Summer the building is used for raising the poults, these being in portable batteries five in height. During the marketing season, the turkeys are all on range and the

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same building is used for killing and preparing the turkeys for sale.

The killing and preparing for market are carried on on the first floor. Turkeys are sold three ways: alive, New York dressed, which means simply picked, and fully dressed and drawn. Half of the second story is a waiting room for turkeys to be killed. Here is one thing that is different from most turkey farms. Seven pens with wire partitions are provided. The turkeys are weighed when they come in from outdoors, separated and put into these pens according to weight. One pen is used for those weighing from 10 to 12 pounds, another for those 12 to 14 pounds, etc. This arrangement saves a lot of time and trouble when picking out turkeys for customers. Having turkeys of different weights to meet customer demand is achieved by buying the poults at different times. Turkeys as heavy as 28 pounds were available last year.

In order to let prospective customers know about the farm, newspaper advertising and radio announcements were used. An advertisement was run in the two daily papers for five days before Thanksgiving and for ten days before Christmas. The advertisements contained a picture of a turkey, the name and address of the farm, the slogan, "The Best Home Turkeys Ever Had," and an invitation to drive out and see the turkeys alive. Radio announcements were made for five days previous to both seasons, 28 announcements each time. These also invited the public to visit the farm.

The visitor entered the plant into the small room used as lobby and office. An attendant asked what weight of turkey he wanted and went to the pen containing turkeys of that weight and brought down several. The customer made his selection, or, more often, told the attendant to select one. The turkey selected was weighed for exact weight. This weight was placed on a linen tag as live weight and the tag attached to the turkey's leg. In addition to the weight, the tag had a printed guarantee of: (1) that it was a 1940 bird; (2) that it was in A-1 condition; (3) that it had been scientifically fed with the best feed to be had. On the reverse side was the name and telephone number of the farm, a picture of a turkey and the announcement, "Drive out and see them alive—you can pick your own turkey or we will do it for you and deliver day and hour you desire."

At the same time the tag was made, the clerk was making out an order for the turkey. Each order had a serial number and this was placed on the tag. These

order forms were made in four copies, the original remaining in the book, the second copy going with the turkey through the plant, the third copy going to the customer, and the fourth copy going to the deliveryman. In addition to all the other information, the order form contained spaces for all three weights—alive, New York dressed and dressed and drawn—and an explanation of these three weights. It also contained a "thank you."

With the turkey tagged and an order form partially made out, the turkey went to the killing room. This was behind a movable partition in one end of the building. The bird was killed, then plunged in a semi-scald water of 128 degrees temperature and then placed in a picking machine which removed practically all the feathers. From here it came into a long room, nearly half the length of the building. A wide table extended the length of the room on either side of which were men and women employees. Whatever feathers still remained were picked by hand by three women. The turkey was then weighed again and this "New York dressed" weight placed on the tag and on the order form accompanying the turkey. If the order called for New York dressed, the bird was now ready for wrapping.

Most of the turkeys were ordered dressed and drawn. On the side of the table opposite the pickers, the dressing and drawing was done. When this was completed, the liver, heart and gizzard were placed in a cellophane bag and placed inside the turkey. The turkey was weighed again and the dressed and drawn weight placed on the tag and order form.

The turkey was now ready for packing. It was first wrapped in cellophane and it was then given a second wrapping of good grade wrapping paper. Enclosed was a printed slip on vegetable parchment paper reading: "This turkey should be unwrapped and placed under refrigeration until you are ready to prepare it for cooking." The printing was in red ink that is not harmful. The slip was enclosed as the bird might spoil if the cellophane wrapping were not removed. The double-wrapped turkey was then placed in a large bag of kraft paper. The bag was imprinted with the name of the farm, telephone number, a picture of a turkey, and delivery instructions.

The wrapped turkey and its accompanying order form now came back to the office and the New York dressed and dressed and drawn weights entered on the order forms in the book. The amount was now figured and entered. All this took but a few minutes of time. The customer

could take the turkey with him or have it delivered.

The prices received last year were 22 cents live weight, 27 cents New York dressed and an additional 25 cents if dressed and drawn. 600 turkeys were sold at Thanksgiving and 800 at Christmas.

A total of 18 persons were employed during the marketing period. "Our greatest trouble was in making deliveries," says Mr. Sprague. "We employed six men for delivery but the area covered was so great that we had to keep on our toes. However, while it was rush work, we accomplished it with no complaints."

"Our success has been due to the fact that we have tried to give customers just what they want. While many customers came to the farm to see the live turkeys, especially families with children, who first saw turkeys in their natural habitat, most of them asked us to do the selecting for them. Of course we had also to do this for the large number of telephone orders that came in. When we made the selection we had the deliveryman ask the customer to unwrap the turkey before he left. This was done for two reasons: first, to be sure the customer was satisfied, and second, to secure full publicity benefit of their reaction when they saw how nice the turkey looked. A great many customers remarked on the attractive appearance of the turkeys. We marketed our entire 1,400 turkeys without a single complaint of any kind being made. This year we have 2,500 turkeys at least and a possible 3,000 and we expect to market all of them at retail."

Grapes or Leafhoppers

Condensed from American Fruit Grower

Howard W. Brody and N. F. Childers
Ohio State University

G. E. Marshall
Purdue University

THE grape leafhopper is undoubtedly a more destructive insect than growers realize. It is to be found in considerable numbers at some period of the year in practically every vineyard. For example, E. Mortenson and U. A. Randolph list grape leafhoppers as the most widespread insect pest of grapes in Texas, stating that these insects suck the juice from the plant tissues, causing minute yellowish specks on the leaf surfaces and, when abundant, causing the leaves to shed.

Their importance is stressed further by recent investigations at Ohio State and Purdue Universities which show that even moderate infestations of leafhoppers in vineyards can result in serious injury to the foliage and ultimately to the fruit.

The experiments in Ohio and Indiana were conducted to determine the effect of various degrees of leafhopper feeding injury on the photosynthesis (food manufacture) and transpiration (water-vapor loss) of grape leaves. The internal structure of leaves also was studied. Plants of the Concord and Delaware varieties were grown in earthenware jars in the greenhouse and, after reaching a desirable size, were moved into an environment-control chamber for the experiments.

In one experiment approximately 20 leafhoppers per leaf were released in a cheesecloth cage over a Delaware shoot and permitted to feed for 30 days. This treatment reduced photosynthesis 66.7 per cent and transpiration 24.1 per cent. Further feeding injury over an additional 20-day period resulted in the abscission (dropping) of most of the damaged foliage and injured the remaining attached leaves so that photosynthesis and transpiration were stopped entirely.

In another experiment 10 leafhoppers per leaf were permitted to feed for 20 days (4800 "leafhopper-hours") and reduced photosynthesis of Concord grape leaves 13.4 per cent. This ex-

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periment was conducted with young growing shoots where periodic measurements of the leaf-area-increase were made. As compared with an uninjured check plant, the rate of growth of the injured shoot was reduced 30 per cent although no leaves abscissed. Therefore, this experiment shows that there is not only a reduction in food manufacture per unit of leaf area but also a reduction in the ultimate size of the leaves.

To determine how leafhopper feeding affects the internal structure of grape leaves, a number of injured leaves were cross-sectioned and examined under the microscope. The insect punctures the leaf, almost without exception through the lower surface, and its proboscis extends through the leaf to the upper layer of cells (palisade) which are the first to be injured. Possibly the insect secretes a digestive enzyme into the cells which dissolves the cell contents. The dissolved contents may then be sucked up by the leafhopper, resulting in groups of empty cells which appear as minute yellowish-green stipples.

It would be well to emphasize here the importance of early control of grape leafhoppers. The various species of leafhoppers which attack grapes spend the winter in the adult stage and become active in the vineyards and orchards of the middle west from the middle to the latter part of June. These adults feed extensively during their egg-laying period but leave less visible effects than the broods of nymphs (young) which follow.

The females lay eggs soon after they emerge from hibernation and die a short time afterward. A few weeks may elapse between the time the adults die and the newly hatched nymphs become abundant. For this reason growers are apt to dismiss the leafhopper problem lightly, assuming that the population will be low for the rest of the season. This feature of the life history of these insects, plus the results of the experiments already described, show that it is highly desirable to secure early control of grape leafhoppers. The importance of such early control may be brought more forcibly to the realization of the grape grower if a few population figures are cited.

Eggs of the new generation began to hatch this season in southern Indiana and Ohio about the middle of June. Counts made in a vineyard with a typical infestation showed that on June 16 there were an average of 2 young leafhoppers per leaf. On June 22 there were 6; on June 30 there were 10. One year the average population was 31 per leaf on August 2 and 50.1 on August 12.

One thorough application of a nicotine or similar spray properly

timed should give good control of the overwintering adults before egg-laying has taken place and so reduce the population for the remainder of the summer that further control measures may not be necessary. The best time for such an application cannot be predicted in advance; it usually will come some time in late May or early June in Ohio and Indiana and neighboring states, according to the location of the vineyard, but the grower must learn to recognize the insects and watch conditions in his own planting to determine exactly when the spray might be applied to best advantage.

Further applications may be made whenever the population of leafhoppers indicates their need, although Purdue experiments show that reducing the population after August 1 as little as two-thirds has a very striking effect on the fruit and foliage. Such a mediocre measure of control is not difficult to attain. It should be borne in mind, however, that leafhoppers can be killed only by directly hitting them with the spray chemicals, making complete coverage, especially of the lower surfaces of leaves, essential for good control. General sanitation around the vineyard and cleaning of fence rows will eliminate possible places where adult insects can hibernate and thus reduce the number which will overwinter successfully.

Drying Hay in Barn

The University of Illinois has developed a drying system for hay in the mow which permits retention of the maximum of carotene and leaves. Similar to the University of Tennessee method, air is electrically blown into the stored hay. Cost of the blower is from 25 to 50 cents per ton. Cost of equipment for a 20-ton mow is about $300. The hay is wilted in the field four to six hours before storing, at which time it contains as much as 50 per cent moisture. The blower reduces the moisture 20 per cent in 7 to 10 days.

—*Jersey Bulletin*

A Ton of Pork

Condensed from American Hampshire Herdsman

John Schwab

Purdue University

OUR Hoosier Ton Litter Club started 18 years ago when it was considered impossible to raise any litter of pigs to weigh a ton in 6 months. Today Indiana farmers are producing ton litters in large numbers, even in less than 6 months.

The Ton Litter Club is popular because it involves competition, stimulates the most desirable farm practices and affords a measuring stick of one's ability as a hogman. Membership has grown by leaps and bounds until now in 1941, 636 members with more than 13,000 pigs are enrolled.

Last year several of our farmers raised an average of a ton of pork for each litter in the herd; not in 6 months, but in 170 days! Gold medals are awarded for one or more litters weighing 2,000 pounds or more; silver medals for litters weighing from 1,800 to 2,000 pounds, and bronze medals for litters from 1,600 to 1,800 pounds. During the life of this project more than 2,000 medals have been awarded.

In 1935 one Indiana farmer raised an average of 1,758 pounds with 9 litters. By careful selection of breeding stock and feeding he raised in 1939 an average of 2,291 pounds with 11 litters.

Another Hoosier hogman made 1,878 pounds as an average for 14 litters in 1935, but five years later his average was 2,034 pounds in 170 days with the same number of litters in the herd.

At least a half dozen other Indiana hog producers have produced an average of a ton per litter with the entire herd.

This remarkable production was accomplished by applying to the entire herd the same practices of saving pigs—sanitation, management and feeding—which were required to reach the ton mark with a single litter. The farrowing houses, barns, self-feeders, water fountains, fences, feeds, methods of feeding and pastures were within the easy reach of the average successful hog grower.

The average age of the herd boars was 24 months and all were of purebred breeding. Pigs from sows weighing at farrowing time from 400 to 500 pounds produced

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pigs weighing from 7 to 9 pounds heavier after 170 days than did the pigs from dams weighing 250 to 300 pounds.

The feeds fed to the sows were similar in all cases. The grains generally were corn, oats and some middlings. The protein feeds were tankage, soybean oilmeal, skimmilk, buttermilk and alfalfa meal—and minerals. All sows and gilts were in more than medium condition at farrowing time.

Farrowing quarters on all farms were well cleaned and disinfected. On two farms the sows farrowed in central houses but sows and litters were moved to individual houses on pasture in a few days. On all other farms individual houses, located on pasture, were used.

The starting feed for the pigs in four herds was a mixture of 70 pounds ground corn, 20 pounds ground wheat and 10 pounds tankage. The other herds were fed shelled corn, some ground oats, wheat shorts, tankage, soybean oilmeal or milk. When the pigs weighed 60 pounds, more shelled corn, some ground wheat and protein feeds on legume pasture were generally fed. All herds were full-fed grain from start to finish. An abundance of drinking water and shade were always provided.

Here is the way I would sum up these points of good feeding and management that enabled these most outstanding Hoosier hog producers to produce an average of a ton of pork per litter in less than 6 months.

1. A week or more before farrowing, move sows to lots or pastures where no hogs have been kept for at least a year to protect health of pigs and to prevent intestinal round worm infestation.

2. If farrowing quarters were used by hogs within less than a year, scrub them with boiling water and lye (1 pound lye to 15 gallons water). They must be dry before using lye on them.

3. Farrowing quarters should be warm and free from drafts to keep sows contented for early spring farrowing. Cover individual houses with straw or corn fodder if necessary.

Now, to protect your pigs from overlaying:

4. Fasten guard rail of 2 x 4 inch timbers, poles or iron pipe, 10 inches from walls and 10 inches above floor of pens.

5. Make a hover under which pigs will sleep: Two 1 x 10 inch boards each 3 feet long, nailed together at ends to form a right angle. Make a tight cover of boards or straw. Fasten securely in corner of pen. Use plenty of clean dry bedding under hover.

6. Always have sows tame for easy handling.

7. Quarters should have a dry floor, clean comfortable bedding,

and other animals should be kept away.

8. Supply plenty of drinking water; feed sows sparingly and only when they want to eat during the first day.

9. Equal parts of ground oats and wheat bran or bran alone, fed dry, is excellent to feed for 2 or 3 days after farrowing.

10. Keep sows contented with comfortable quarters, proper rations and careful handling.

11. From 5 to 7 days after farrowing, allow sows and pigs to exercise daily on sod or other clean ground. This helps to prevent anemia.

12. (A) Shelled corn 1 bushel, good oats 1 bushel, meat and bone scrap or tankage 10 pounds. Feeds may be mixed or tankage may be fed ½ pound per sow daily in trough. (B) Ground corn 1 bushel, ground oats 1 bushel, or 20 pounds ground wheat or middlings, and meat and bone scraps 10 pounds mixed. (C) Ten pounds either following mixtures may replace 10 pounds of meat scraps: Meat and bone scraps 50 pounds, soybean oilmeal 50 pounds. Or meat and bone scraps 20 pounds, fish meal 20 pounds, soybean oilmeal 40 pounds, cottonseed meal 10 pounds, alfalfa meal 10 pounds. When pigs start eating grain, feed sows liberally, or self-feeders may be used successfully.

13. Sows must have a liberal supply of water. It is as important as feed. Sows' milk is more than 80 per cent water.

14. Feed minerals for sows, also extra salt in self-feeder.

15. Here are some good pig starters: (A) 70 pounds coarse-ground shelled corn, 20 pounds coarse-ground wheat, 10 pounds high grade meat scraps or tankage. (B) 45 pounds coarse-ground corn, 45 pounds coarse-ground wheat, 10 pounds meat scraps or tankage. (C) Shelled corn in self-feeder and skimmilk twice daily in troughs.

The meat scraps or tankage in mixtures A and B may be changed to 5 pounds meat scraps and 5 pounds of soybean oilmeal. The ground wheat may be replaced with equal amounts of flour middlings. Shelled corn may be fed in addition to either pig starters A or B. Self-feed pig starter until pigs weigh 70 pounds or more. Always use clean, palatable feeds; moldy feeds will not do.

16. A self-feeder suitable for young pigs keep feeds cleaner, helps to prevent robbing and gives pigs of various sizes an equal chance. Gains are made faster and more economically and pigs remain healthier than is common by trough feeding. Always keep feeder supplied with feed in good working order. Provide 1 foot of self-feeder space for each eight pigs.

17. Locate self-feeder in a creep or make a pig diner in which feed will be kept dry. Have a fountain of good drinking water close to feeder. Pigs require approximately 500 pounds of water for 100 pounds of gain.

The famous Purdue 7-2-1 Ration contains 700 pounds ground corn, 200 pounds wheat middlings and 100 pounds mixed supplement and is self-fed. Two most effective Purdue supplements for pasture feeding are Supplement E—20 pounds meat and bone scraps, 20 pounds fish meal, 50 pounds soybean oilmeal, 10 pounds cottonseed meal; and Supplement C—which substitutes 10 pounds of linseed oilmeal for 10 pounds of soybean oilmeal.

Cows Get Sprouted Corn

High-producing dairy cows fed grain for maximum output, often develop breeding trouble. That has been avoided at the Lamar A. Young farm in Trumbull County, Ohio, by feeding a handful of sprouted corn, thrice daily, to each cow. The dairyman who operates a steam boiler, to provide steam and hot water in the milkhouse, can utilize it to provide heat for a sprouting chamber.

—*Cappers Farmer*

Influence of Processing on the Properties and Flavor of Milk

Condensed from Certified Milk

P. F. Sharp, Ph.D.

Professor of Dairy Chemistry, Cornell University, Ithaca, N. Y.

FACTORS such as feed, breed, management, stage of lactation, season and disease influence the properties of the milk as secreted. Processing begins with the milking of the cow and ends with the drinking of the milk. Processing is performed with the following objectives in mind:

1. Reduction of the sanitary hazard to the vanishing point.
2. Prevention of the entrance of and control of the growth of bacteria.
3. Prevention of non-bacterial chemical changes.
4. Control of physical properties.

Faulty processing may result in:

1. Milk-borne epidemics.
2. Development of undesirable flavors in milk.
3. Loss in nutritive value.
4. Undesirable alterations in physical properties.

This discussion will be limited to factors which are of importance in the processing of market milk; especially those factors which influence flavor, nutritional value and physical properties.

Lipase. Raw milk contains the enzyme lipase which is capable of hydrolizing milk fat. Lipase action in milk produces much more pronounced flavor defects than does lipase action in other foods because the resulting hydrolytic products, particularly butyric, caproic and caprylic acids, have a very disagreeable odor and a bitter taste.

Lipase may be present in the active or the inactive state. The amount present may vary to some degree, yet all raw milk contains enough of this enzyme, if activated, to greatly injure its flavor. The enzyme tends to be naturally more active in milk from cows in advanced lactation in the winter time.

Rate of cooling milk is important. About three times as much lipolysis occurs in milk held cold after cooling in air or in cans with cold water, when compared with milk cooled rapidly by

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a plate or surface cooler. This is an effect of rate of cooling on the physical properties of the fat in the globules which in turn influences the surface characteristics of the fat globules.

If raw milk has once been cooled it should not be warmed within the zone of 70° to 105° F. and then be cooled again because this temperature treatment activates milk lipase. If cold raw milk is warmed to 86° F., the temperature at which most significant activation occurs, and is then cooled again to 40° F., a rancid taste will be detected in an hour or less. This knowledge is of particular importance in warming cold raw milk for centrifugal cream separation. If it is desired to separate between 70° and 105° F., the milk should first be warmed to 110°-115° and then cooled to the desired temperature to avoid activating the lipase. This peculiar behavior is also related to alterations in the physical state of the fat in the fat globules. Mixing cold night's milk with warm morning's milk is undesirable from the standpoint of lipase activity if the mixture is to be cooled and held. The effect is small, however, unless the temperature of the mixture exceeds 70° F.

A surprising effect of temperature on the lipolysis of raw milk has been observed; namely, that the lower the temperature of holding, from 75°-80° F. down, the greater the lipolytic activity. This is particularly true in milk or cream which has been activated by cooling, warming and cooling. Lipolysis is accelerated by shaking while the fat is in the liquid or semi-liquid state. Homogenization also induces lypolytic action to such an extent that rancidity can be detected by odor and taste within 30 minutes after homogenization.

Lipase action produces one of the flavor defects most prevalent in raw milk and cream. It is not a factor in pasteurized products unless the lipolysis occurred prior to pasteurization, because the enzyme is destroyed by heat.

Creaming. Milk contains an agglutinating agent which is absorbed on solid fat globules but not on liquid fat globules. This agglutinin must be absorbed on the fat globules to induce clumping. Only after the globules have clumped will the fat rise in a reasonable time to form gravity cream. If the clumps in cold milk are broken up, for example by agitation, it is necessary to rewarm and recool the milk in order to make the fat globules clump again and restore the good creaming properties of the milk.

If fat globules are separated while the fat is in the liquid state, then the agglutinin will not be present on the surface of the fat globules and consequently the

cream will be deficient in agglutinin, and most of it will appear in the skim milk. On the other hand if separation takes place when the fat is solid, the agglutinin will be on the surface of the fat globules and consequently will be present in the cream, which will be viscous, and absent or low in the skim milk. By combining low temperature separated cream with high temperature separated skim milk very good creaming milk will be obtained, but if high temperature separated cream is combined with low temperature separated skim milk, gravity cream will not form except after a very long time. If cream is separated from cold milk at 40-45° F. to obtain a cream of 25-30% fat content and this cream is then warmed to melt the fat in the globules and is reseparated at 120-140° F. to obtain some additional skim milk, this additional skim milk will be very rich in agglutinin, and if reconstituted milk is made with it, gravity cream volumes as high as 80% may be obtained in milk containing 4.0% of fat.

It often happens that milk, particularly from Jersey and Guernsey cows, does not cream when cooled. Milk of this type will give very deep cream layers if warmed to 110-120° F. prior to cooling. It seems that the agglutinin must be completely liberated from the surface of the fat and then must reabsorbed on the solidifying fat globules.

Oxidized flavor. During the past ten years increasing attention has been directed toward the elimination of the so-called papery, cappy and metallic flavors of milk. Copper is known to increase the rate of development of these flavors and changing from equipment made of copper and copper alloys, to stainless steel equipment, has helped to reduce the oxidized flavors in milk. Even the complete prevention of contact with metal does not insure against the development of oxidized flavor. Difficulty with oxidized flavor increased greatly with the improvement in sanitary conditions and lowering of the bacterial count of the milk. At the beginning it was believed that when the bacterial count was decreased and the sour flavor eliminated our milk flavor troubles would be over. It was not realized then that the bacteria we were trying so hard to eliminate were actually aiding us in one respect, namely, by preventing the oxidized flavor.

In general it can be said, other things being equal, that the lower the bacterial content of the milk the more readily the oxidized flavor develops. Oxidized flavor can usually be prevented or retarded by adding bacteria. Oxidized flavor is less prevalent in raw than in holder pasteurized milk. On the other hand heating

to 170° F. or above for 10 minutes prevents oxidized flavor but injures creaming and produces a cooked flavor.

Efforts have been made to prevent the development of oxidized flavor by the addition of substances other than bacteria. Some of the substances which prevent oxidized flavor, when added to milk are proteolytic enzymes, hydrogen peroxide, hydroquinone, and Vitamin C. Of the various substances suggested there is least objection to the addition of Vitamin C.

When we first discovered that the oxidized flavor could be prevented by the addition of Vitamin C we at once thought that the reason oxidized flavor was more prevalent in milk in the winter time than in the summer was because of a difference in feed. Our feeding experiments failed to convince us that the difference was due to feed or feed alone. Others, however, have later convinced themselves that feed is the controlling factor.

Vitamin C in milk. Of the various vitamins in milk, C is the most sensitive to destruction. The Vitamin C content of milk begins to decline from the time of milking. Its decline is accelerated particularly by copper contamination. It is often stated that pasteurized milk contains less Vitamin C than raw milk because it is destroyed by pasteurization. Actually the destruction is due to increased copper contamination and most of the destruction occurs after, not during, the heating. Furthermore, high temperature heating tends to retard the destruction of Vitamin C. Milk heated to 170° F. for 10 minutes contains more Vitamin C at the end of three days than raw milk when held the same length of time.

The Vitamin C content of fresh milk is about 22.2 mgm. per liter. Commercial bottled pasteurized milk at the end of three days averages 2.9 mgm. and raw milk 8.5 mgms. If the Vitamin C present in a quart of milk as freshly drawn were preserved it would be equivalent to that in the juice of a small orange or to that in many of the vitamin capsules which are now sold by pharmaceutical firms. We should apologize to the cow and the consumer for allowing the Vitamin C content of the milk to fall to such low values because the cow puts enough Vitamin C into the milk which, if preserved in that portion of the milk which enters human consumption, would approximate that in half the citrus crop of the United States.

Deaerated milk. With the advantage of hind sight, deaeration now seems obvious as a method of preventing oxidized flavor and preserving Vitamin C. There were many reasons, however, why

other substances and not dissolved oxygen were thought to cause the oxidized flavor in milk. This accounts for our delay in trying deaeration to prevent oxidized flavor and to preserve Vitamin C. The deaeration investigations were carried out in conjunction with Professors Guthrie and Hand.

Deaerated milk, either raw or pasteurized, does not develop the oxidized flavor and the Vitamin C is stable. In deaerated milk dissolved copper does not cause oxidized flavor or the destruction of Vitamin C. The less the copper contamination and the shorter the time interval between milking and deaeration, the greater is the amount of Vitamin C which it is possible to stabilize in the milk. Deaeration affords a method of preventing oxidized flavor and stabilizing Vitamin C at the same time, which does not involve the addition of substances to the milk or a lowering of bacterial standards.

A small scale commercial deaerator was constructed and installed at Cornell. The principle involved is to create high enough vacuum to convert about 0.5% of the water to vapor and use this vapor to sweep out the dissolved oxygen. The deaerator operates continuously at a rate of 1500 quarts an hour and at a cost of about eleven cents. The vacuum is created by steam jets.

Details of handling the milk and delivering it air free to the filler bowl have been completed. We are now developing a bottom-up type of filler and have developed and tested one form of valve which will fill a quart bottle completely in 4.2 seconds without incorporating an appreciable amount of air.

Irradiated milk. Milk is normally low in Vitamin D and special efforts have been made to increase it. This has been done by irradiation of the milk, feeding irradiated yeast to the cows and by adding Vitamin D concentrate to the milk.

Irradiation tends to destroy the Vitamin C in the milk unless the milk is oxygen free during irradiation.

Vitamin A and G. These two vitamins are not adversely affected by ordinary processing and handling so the milk at time of consumption is as rich in these vitamins as it was when produced.

Vitamin B1. The literature indicates a slight destruction of this vitamin as a result of pasteurization but not a great deal of work has been done along this line.

Reducing Feed Grinding Costs

Condensed from Missouri Ruralist

MOST of us do not like rules. But when someone comes along with a list of rules that will save our money, that is an entirely different matter. Rules of this kind have been prepared to help farmers reduce the cost of grinding feed and at the same time increase the quality of grinding jobs.

Grinding costs are controlled by several factors, and often we overlook these entirely. Cost of grinding grain is influenced, first of all, by coarseness of the grind. Along with this, condition of the material and the way it is fed into the machine have an important bearing on grinding expenses.

If you grind with a tractor, you can do the job more economically by having your tractor power properly matched to the capacity of the mill. By using too large a tractor, the mill is over-powered and is usually overfed. On the other hand, using too small a tractor for the mill capacity results in stalling the power unit and slowing its speed, or throwing the belt off.

Most mills are designed to operate at 2,200 to 2,400 revolutions a minute. At this speed the hammer tips travel nearly 3 miles a minute. To maintain this speed a good belt is needed, and it is advised that a rubber belt is usually the best investment in the long run.

Since the manner in which the mill is fed influences cost of grinding, it deserves some close attention. One ear of corn thrown into the rotor of a hammermill grinder puts a 4-horsepower load on the motor. If a scoop of ear corn is thrown into the rotor it may mean a sudden jolt requiring 40 horsepower or more to overcome. Surge loads of this kind waste power and gasoline, so ear corn should be dropped into the tray and allowed to slide into the mill evenly.

The most satisfactory method of feeding a grinder is by use of a traveling feed table. This eliminates the work of one man, provides for uniform power requirements and reduces gasoline expense. In a test comparing different methods, the cost of gasoline for grinding 1,000 pounds of ear corn, hand-fed, was 7¾ cents. Under identical conditions the same quantity of ear corn was ground in a traveling feed table model mill at a cost of only 4½ cents for gasoline.

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Grinding with too fine a screen cuts the capacity of the mill and as a consequence raises the cost of grinding. In a grinding test with oats, using tractor power, it was found that 33,000 pounds an hour could be put thru a ¼-inch screen. But with the same tractor and a $\frac{3}{16}$-inch screen, only 2,500 pounds could be ground. With a ⅛-inch screen, only 1,800 pounds could be handled.

In a test at Ohio State University, it was found that to grind wheat extremely fine cost 9.8 cents a hundred, whereas a coarse grind cost only 5.8 cents, with the same equipment.

In brief, here are the rules recommended for economical grinding:

1. Match your mill to your power available for balanced operations.
2. Use a good belt, plenty wide, and keep it as tight as possible. A rubber belt is better than canvas.
3. Feed your mill as evenly as possible. An experienced operator can tell by sound when the mill is being properly fed.
4. Use as coarse a screen as possible to obtain a satisfactory grind. Remember that each size finer screen means a reduction in capacity or an increase in power required.

For Cutting Trees

Housatonic Farms, Southbury, Connecticut, uses a circular saw outfit which a local machinist built on the front end of a crawler-type tractor. The shaft can be raised or lowered and moved forward or backward for sawing. A gear box is connected with the tractor power take-off. The rig also has an auto-bumper to push cut trees in the direction the operator wants them to fall.

—*Farm Journal*

Methods and Rations for Fattening Poultry

Condensed from Scientific Agriculture

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THE comparative efficiency of the various practices designed to improve the market quality of stock is, in the final analysis, secondary to the economy of their action. While certain methods of fattening for market are definitely more efficient than others it becomes necessary to balance their increased efficiency against the cost of their application. In connection with a series of experiments on methods and rations for fattening poultry the present cost analysis has been made.

Part of the data shown herein was obtained from a fattening test previously reported in Scientific Agriculture. This particular test was chosen for several reasons, firstly because an excellent but not unusually high response to fattening treatment was obtained, and secondly because the test was controlled by a group of related cockerels which remained under the usual range conditions. For purposes of reference it should be stated that the data used were those of group B (crate fattened) which received ground yellow corn including 10% beef fat as a fattening mash, and group E which were kept on range, complete detail of both of which may be seen in the publication referred to above. The range group considered in this analysis had adequate range on alfalfa fields and received scratch grain night and morning with a growing mash mixture available in hoppers at all times. The gains recorded are from starved weight to starved weight in all instances with the exception only of those of the capons. In calculating feed costs for both the range cockerels and capons a consumption of 2 parts of grain to 1 of mash was used as being a satisfactory approximation to usual conditions. On the crate fattened and range fed birds actual commercial gradings were available, while for the capons the condition of fatness as accurately determined by a method of sampling previously reported upon plus the appearance of the dressed carcasses were used as the basis of an estimate of grading.

The feed prices quoted are actual as are also the dressed

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poultry prices which were those being paid to country shippers at the time of the experiment. In this connection it should be noted that all gradings were made on a commercial basis exclusive of the degrading effect of skin tears, too many pin feathers, etc., which are under the control of the producer. The grading allowed therefore is the best that could be obtained and presupposes great care on the part of the producer in proper killing and handling of the dressed birds. The feed consumption to 7 lb. weight or to the commencement of fattening is taken from extensive data on cockerels and capons published in mimeographed form from this Division. No attempt has been made to calculate labour, equipment or interest costs in this work since they vary over such a wide range and should be estimated by each individual operator in the light of his own circumstances. It should be pointed out that crate feeding involves crates, but since they are commonly satisfactorily made of waste or very cheap lumber they do not constitute a heavy cost.

Results

Table 1 is a summary of the cost data obtained. One of the main features is the relatively poor gain of the range fed birds. This may to a large extent be due to a relatively large requirement of feed to maintain activity and body temperature under range conditions in this latitude.

Considering feed consumption, it will be noted that this was very similar for all three classes. The slightly lower consumption of the capons is in line with their lower gain and the decreased activity characteristic of capons as a class. The fluid skim milk fed to the crate fattened birds had little effect on the total consumption of that group if considered on a dry matter basis (10% dry matter).

Summing up the matter of gain and feed consumption the results are largely explained by a consideration of three factors namely, temperature, activity and suitability of feed. Under crate fattening conditions temperatures are moderate, activity is reduced to a negligible quantity, and feeds are given in palatable form and of a nature calculated best to increase gains, particularly of fat. Hence the results of crate fattening as indicated by these data are large gains on moderate feed consumption. On range, on the other hand, temperatures are low, activity is great, and gains are relatively small even on heavy feed consumption because of the large demands for maintenance of body temperature and activity. The higher requirement of feed to maintain temperature under cold conditions without activity but with good fattening feeds has already been reported.

TABLE 1—COSTS AND RETURNS ON CRATE FATTENED COCKERELS, UNFATTENED COCKERELS AND CAPONS

Treatment	Gain in 2 wk.	Feed consumption		Feed cost		Value of gain			Profit over feed cost	Profit due to crate feeding or caponizing	Average feed consumption to 7 lb. weight	Feed cost to 7 lb. weight	Value of dressed birds at 7 lb. weight	Profit over feed cost	Total profit over feed cost at marketing
		Mash	Milk	Actual	Per lb. gain	Weight gained	Increase in grade	Total							
	lb.	lb.	lb.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	lb.	cts.	cts.	cts.	cts.
Crate fattened cockerels	1.21	4.21	4.41	8.37	6.92	19.36	11.89	31.25	22.88	23.82	39.00	76.00	112	36.0	58.9
Range fed cockerels	0.42	4.14	—	7.66	18.24	6.72	—	6.72	—0.94	—	39.00	76.00	112	36.0	35.1
Capons	0.31	3.90	—	7.21	23.25	4.96	10.78	15.74	8.53	4.47*	35.00	68.00	112	44.0	48.5

*Charge of 5c per bird deducted to cover cost of caponizing.

Costs allowed for various feeding stuffs: ground yellow corn 1.5 cts. lb.; beef fat 2.5 cts. lb.; skim milk 0.20 cts. lb.; starter mash 2.75 cts. lb.; growing mash 2.25 cts. lb.; scratch grain 1.65 cts. lb.

Calculated value for dressed carcasses: Grade B—16 cts. lb.; Grade A—18 cts. lb.

It was presumed that all stock before fattening would on the average be grade B which is approximately the case since very few birds would be sufficiently fat to enter A grade. In any case this treatment is comparable for all groups. The much greater return for the crate fed birds was due to their large gain and improvement in the grade of the carcass. An increased price of 2 cents per pound is paid for grade A roasters over grade B. Since the range fed group contained 19.4% grade A birds whereas the crate fed birds had 94.4% of this grade, the former was subtracted from the latter and the residual percentage was multiplied by 2 cents to obtain the rate in cents per pound which must be applied to the final dressed weight of the birds to determine the additional value brought about by increase in grade. Since it is impossible to grade the birds at the beginning of the 2-week period, the acceptance of the 19.4% of grade A birds as the basic standard becomes necessary. An increased value per bird through superior grading of as high as 11.89 cents in 2 weeks' fattening is the net result of the fattening process, which when added to the value of the weight gained becomes 31.25 cents per bird for this fattening period. The range cockerels had on the average 43.7% of fat in the area of the main breast feather tract whereas the capons had 59.58% and the crate fattened cockerels 63.58%. It has been previously reported that the percentage of fat in a sample from this area is an excellent guide to the fatness of the whole carcass and particularly to the skin and subcutaneous fat which is of the greatest importance in obtaining a high grading. An examination of the dressed carcasses in conjunction with the percentage of fat of the capons indicates that with possibly one exception all birds amongst this group or 94.7% were capable of entering A grade, making a net valuation of 1.51 cents per pound for increased grading over the range group. In addition to the degree of fatness there was a satin-like finish to these birds which made a very attractive appearance and enhanced their grading quality. The increased softness of skin was readily apparent when sampling as the skin offered practically no resistance to the sharp scalpel whereas even with the crate fattened cockerels the keen edge of the blade was quickly lost after cutting a relatively few samples. The capons were therefore much superior in grading to the range cockerels and were credited with a total of 15.4 cents per birds for the value of the gain made in the 2-week period and for the improvement in market quality.

Returns from 2 weeks of fattening after deduction of cost of feed amounted to 22.8 cents per bird. There was a net loss of 0.94 cents per bird on range making the total additional profit over the range group due to crate fattening to be 23.8 cents per bird, a substantial amount. For capons over the 2-week period the net profit attributable largely to their native quality was 4.47 cents per bird after allowance was made for the cost of caponizing at 5 cents per bird.

Apart from the improved financial returns it is of more than passing interest to know the feed cost to raise cockerels and capons to time of fattening, or 7 pound weight in this instance, and to calculate the net returns on the whole operation from hatching to marketing. These figures are shown and when added to the profit for the gain for the 2-week period indicate a net return of 58.9 cents per bird under crate fattening treatment, 35 cents per bird if killed off range, and 48 cents per bird for capons. It will be noted that since less feed is required to raise a capon to 7 pound weight than for cockerels, owing without doubt to the relative docility and inactivity of the former, the capons compare very favourably with the crate fattened cockerels. The actual profit return must be further reduced in all instances by the actual or calculated costs of the original chicks.

The above reported data throw some light upon the economics of crate fattening, caponizing and range rearing when preparing stock of roaster age for market.

Range Rearing for Market

Considering the killing of birds directly off range for market, it is apparent that during the last 2 weeks prior to killing the gain may be so small as to be less in actual value than the cost of feed. Where conditions make it impossible to caponize or crate feed it is of interest to note that over the whole rearing period a profit over feed cost of 35 cents per bird is recorded for range fed stock.

Crate Feeding for Market

The data presented indicate very definitely that crate feeding is productive of the greatest gain at moderate feed cost and of very much higher quality dressed birds than can be produced by range feeding. The cost of the crate feeding equipment and the time involved are greater for this method, however, and must be charged against the greater profit of 10.4 cents and 23.8 cents per bird over caponizing and range feeding respectively according to the individual operator's equipment costs and evaluation of time and labour involved. The actual comparative efficiency of the three finishing operations is prob-

ably best indicated by the profit over feed cost of 22.9 cents per bird for crate fattening, of 8.53 cents for caponizing, and the loss of 0.94 cents per bird from range feeding. Under conditions where no definite premium is paid for quality of the dressed bird, crate feeding, of course, would be relatively unprofitable, but under Canadian conditions where a definite price differential exists for quality, crate feeding represents the means to the greatest actual return in preparing for market.

Caponizing

In this analysis caponizing has proven to be exceeded only by crate fattening in results obtained. When factors such as lack of accommodation make crate fattening impractical caponizing may be the best method of obtaining the greatest returns. The cost of caponizing has been charged at 5 cents per bird which is the usual charge. Many operators, however, quickly learn to caponize efficiently under which conditions the net return through caponizing would be higher to the extent of this charge. Briefly therefore, it may be stated that the advantages of the capon are that they can run with the pullets, which is not the case with cockerels; they require less feed to reach a given weight; they are almost as fat as well crate fattened birds even when killed off range; and they may be expected to show a much greater profit than cockerels left on range to killing time, and may even closely approach that obtainable from well crate fattened birds.

All things considered, it is safe to say that caponizing as a means to the profitable production of quality stock should be the principal competitor of crate feeding and have much wider application than is at present the case.

In using the data for profit over feed cost, it should be borne in mind that the original cost of the chick, depreciation on housing and equipment, interest on investment and labour costs have not been considered.

An investigation into the efficiency and costs of production of market poultry of the roaster class by three methods, namely, crate fattening, caponizing or killing off range, has shown the following:

1. Crate feeding was the most efficient method and was productive of very high quality stock. A total profit over feed cost of approximately 59 cents per bird was shown for this method of finishing. The extremely high efficiency of the fattening period was evidenced by a feed cost per pound of gain of 6.92 cents for the crate fattened birds as against 18.24 cents and 23.25 cents for the range cockerels and capons respectively.

2. Caponizing for market was the next most efficient method and was very economical because of the lower feed requirement of capons during the rearing period and on account of their relatively high degree of fatness even when killed off range. A total profit over cost of feed of 48 cents per bird after deducting the cost of caponizing was realized in these tests.

3. Killing of cockerels for market directly off range was the least economical procedure in that gains were low and at a relatively high feed cost and market quality was such as to draw a much lower market evaluation than either crate fed cockerels or capons. A total profit over feed cost of 35 cents per bird was shown for these birds.

Culinary Herbs as a Hobby

Condensed from The Southern Planter

STARTING a few years ago with culinary herbs as a hobby, Charles H. Merryman has developed at Weathered Oak Herb Farm, near Bethesda, Maryland, one of the finest herb gardens in the country from which he is netting a substantial income. Over 100 varieties of herbs are grown on this quaint little 25-acre farm. Plants and the cured herbs are shipped all over the United States, to the Philippines and the Hawaiian Islands.

"We simply revived and are attempting to develop a lost art in this country," Mr. Merryman told us at his place this spring. "The South once was famous for its herb gardens. Aromatic plants, unlike strong condiments, add subtle, delightful flavors to foods. Herbs played a major part in making Southern cooks and cooking famous in days of old. The growing of these herbs," he went on, "required a great deal of skill, patience and hand labor, nearly all of which was supplied by slaves. After the War between the States, Southern labor became scarce and the art of herb culture was lost, except for an occasional old Negro or antebellum estate that clung to the past and continued to grow clumps of basil, balm, mint, rosemary, sage and thyme in borders and edgings of gardens. The big commercial spice companies have been built upon this scarcity of homegrown seasonings."

Most condiments in modern times have been grown in Continental Europe and shipped to America. But the present war and the destruction of the European herb plantings, have shut off condiment supplies, a situation that may continue for many years. Some herbs that in normal times sold for 3 to 4 cents a pound now are selling, due to their scarcity, up to 75 cents and $1.00 per pound.

Herbs are not difficult to grow. They require about the same soil and fertility as almost any good farm garden can supply. Any successful gardener can grow herbs. Some are hardy perennials, coming up each spring to produce their spicy seed and leaves; others are annuals, requiring seeding or transplanting each spring to get their fragrant flowers and foliage. The seed are sown in greenhouses or coldframes and the plants set outside when danger of frost is past and the soil has warmed up. Most

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culinary herbs require full sun.

There are three greenhouses at Weathered Oak in which the propagation work is done. The plants are hardened off in early spring and sold or transplanted to produce on the place. Once established, the plants are worked carefully to obtain maximum growth and quality before harvest time. The time of cutting and method of curing vary with the plant; but for most herbs, the plant is cut when mature and is brought inside to cure.

For curing, Mr. Merryman has built racks of fine-meshed poultry wire in the attic of his herb house. The wire is covered with fine cheese cloth to prevent the metal from coming in contact with the herbs. After drying, the herbs are stripped and crushed coarsely by hand. "We never use metal grinders because we feel that metal alters herb flavors, just as water ground cornmeal tastes better than that ground by modern machinery. The latter heats the meal, turns it blue and tends to change the taste," Mr. Merryman said. "Coarsely ground herbs retain their seasoning qualities better than finely pulverized materials."

The Weathered Oak herbs are sold in bulk or placed in jars and marketed locally. Some blending is done. For instance, one combination of several herbs is used for omelets and egg dishes, another for poultry dressing, a third for salads, a fourth for stews and sauces, a fifth for heavy soups, etc. We brought a little jar of the omelet herbs back to Richmond and tried the mixture in our own Test Kitchen, using the following French omelet recipe which Mr. Merryman gave us:

French Omelet for Four Servings

6 eggs
6 tablespoons of milk, thin cream or warm water
¾ teaspoon salt
Pepper to taste
1 or more tablespoons butter, according to size of pan
½ teaspoon flour
2 teaspoons omelet herbs, more or less, to taste; or else single ingredients of herbs such as fresh chives, fresh or dried basil, sweet marjoram, chervil, thyme (only a small amount), parsley, etc.

Place butter in frying pan, low heat. Mix eggs gently (not with egg beater), until whites and yolks are well blended. Heat slightly whatever liquid is used (milk, cream or water); combine it with the herbs and seasonings, and then combine with the eggs. Beat very gently. Melt enough butter to cover the bottom of a heated pan. Pour in mixture. Cook slowly with a low heat. As omelete cooks on the bottom, slip a knife or spatula beneath it so that the uncooked liquid can flow under the cooked. Towards end

of the cooking, increase the heat slightly to brown bottom. Fold omelet after loosening it from the pan with a spatula. Serve in hot platter.

The blending and use of herbs in cooking is an art. Here are a few uses of common sorts that many will recall and others will want to try:

Boiled Leg of Lamb: A famous old recipe calls for a slit to be made in the leg of lamb with a few leaves of rosemary inserted before cooking.

Roast Beef with Tarragon: A familiar French recipe is to scatter tarragon leaves, either fresh or dried, over a roast of beef before it is placed in the oven for cooking.

Roast Pork with Rosemary: Some cooks like to sprinkle rosemary leaves over the pork before roasting.

Fish Sauce: In any type of fish sauce may be used fennel seeds or French sorrel. Tarragon, dill, chives or sweet marjoram may be used to make a drawn butter sauce.

Porterhouse Steak or Hamburg Steak Sauce: Use tarragon, dill, chives or sweet marjoram in a drawn butter sauce to be poured over the steak.

In the making of dishes from "leftovers," herbs add new and delightful flavors. In salads, soups and sauces, herbs give that different taste which only expert cooks can achieve. In drinks, jellies and vegetables, green leaves of aromatic herbs in summer give unusual variations.

Finally, the place of herbs in the landscape scheme should not be overlooked. The splash of color in the leaves and the fragrance of flowers and foliage make them most useful as ornamentals.

Contaminated Soils Are Source of Some Animal Diseases

BACTERIA in the soil have a direct relation to diseases in cattle it is pointed out by chemists at the laboratory of the Bureau of Animal Industry of the Department of Agriculture. Almost all soils, it is stated, in the upper layers to a depth of probably 10 to 20 feet contain bacteria of various kinds, dependent upon the kind and nature of the soil and the amounts of moisture and organic matter they contain. Many species of the bacteria are harmless from the standpoint of animal diseases and are necessary in soil preparation and the growth of various plants.

In most cases the bacteria capable of causing diseases in animals are in the surface layers of the soil, the most important are present in spores and are found only in soil in certain localities. Porous soils containing much organic matter are the most favorable to the development of disease producing bacteria.

The more important diseases, sometimes considered as soil borne diseases are anthrax, blackleg and malignant edema. Others caused by bacteria which are widely distributed are tetanus or lockjaw and botulism. Other bacteria which are believed to live for a considerable time and possibly multiply in the soil, are those causing hemorrhagic septicemia, swine erysipelas, setinomycosis, necrotic enteritis, foot rot in sheep, necrotic stomatitis and many of the diseases caused by parasites.

Practically all other bacterial diseases may be caused in susceptible animals by contacts with soils recently contaminated on the surface with specific bacteria causing diseases, provided the soils have not been exposed to sunlight or some other influence capable of destroying the bacteria. Tuberculosis and Bang disease belong to this group, as well as some of the virus diseases of which hog cholera is an example. Surface soils may become contaminated by excrements of afflicted animals, by carcasses of animals, materials of animal origin from diseased animals when used for fertilizer, by materials carried on the shoes of persons or by any materials or equipment carried to other premises, particularly by healthy animals and birds.

Any of the diseases of the group caused by spore forming germs may occasionally occur following construction and repair work on previously contaminated premises. Cases of anthrax have been known to occur on an adjoining premise when soil from excavations was dumped on the adjoining premise; also this accounts for occasional cases of anthrax following excavation with alteration of old barns and in new barns soon after they have been occupied by livestock.—*Weekly News Bulletin, Penna. Depart. of Agri.*

Soybean Oil Makes Traffic Paint

DURABILITY and quick drying are the two main essentials of traffic paints, used on pavement to mark out traffic lanes and parking spaces and to paint signs on the road surface so that the driver may be warned even while he is watching the road ahead. A good traffic paint should also retain its color for as long as it will last in use.

Soybean oil, treated by a new process just developed at the U. S. Regional Soybean Laboratory in Illinois, promises to meet the needs for traffic paint, and to compete in this respect with imported tung oil or serve as a substitute for tung oil if Asiatic conditions interfere with imports. Tung oil now costs about twice what it did before the Far-Eastern war interfered with the supply. Production of tung oil in the Gulf States is not likely to supply more than a fraction of the requirements.

Soybean oil has made an excellent record for durability in ordinary paints and varnishes, but it dries too slowly to serve as a base for traffic paint. But recent research at the Laboratory, according to Dr. R. T. Milner, director, shows that heating the oil with an organic chemical that acts as an "accelerator," speeds up the thickening of the oil which leads to a fast drying varnish. Addition of a resin or gum and pigment, and of a thinner, forms a satisfactory traffic paint, the experimenters think on the basis of early tests. A large scale test under service conditions on highways is starting soon.

Traffic paints have called for importation of thousands of gallons of tung oil. If the new paint proves satisfactory, it will be an outlet for thousands of gallons of soybean oil, and doubly welcome because the soybean crop has been increasing rapidly in recent years. The Bureau of Agricultural Chemistry and Engineering points to this research work as a typical example of the kind of investigation that is now getting under way at the four regional laboratories devoted to discovering new industrial uses for farm products.

FOR THE FARMER'S LIBRARY

These books are recommended as outstanding in their field:

Beef Cattle—By Roscoe R. Snapp, Asso. Prof. Animal Husbandry, Univ. of Illinois. John Wiley & Son, Inc. $4.00.
(See Farmers Digest, November, 1939)

Beekeeping—By Everett Franklin Phillips, Professor of Apiculture, Cornell University. Published by the Macmillan Co. $4.00.
(See Farmers Digest, July, 1940)

Breeding Your Own, or Raising Colts for Pleasure and Profit—By Clarence E. Bosworth. The Derrydale Press ($10.00). A book suitable for the breeders of hunters' and saddle horses.

Conservation in the United States—By Gustafson, Ries, Guise and Hamilton. Comstock Pub. Co. $3.00.
(See Farmers Digest, July, 1940)

Dairy Cattle and Milk Production—By Clarence H. Eckles, B.S.A., D.Sc., late Chief, Div. of Dairy Husbandry, Univ. of Minnesota. Macmillan Company. $3.60.
(See Farmers Digest, February, 1940)

Feeds and Feeding—By F. B. Morrison, Prof. of Animal Husbandry and Animal Nutrition, Cornell Univ. Morrison Press. $5.00.
(See Farmers Digest, October, 1939)

Farm Meats—By M. D. Helser, B.S.A., M.S., Prof. Animal Husbandry, Iowa State College. Macmillan Co. $2.90.
(See Farmers Digest, January, 1940)

Farm Records—By John A. Hopkins, Ph.D., Asso. Prof. of Eco., Iowa State Col.; pub. by Collegiate Press. $2.50.
(See Farmers Digest, October, 1940)

Forestry in Farm Management—By R. H. Westveld, and Ralph H. Peck, John Wiley and Sons, Inc. $3.00.
(See Farmers Digest, September 1941)

Fruit Crops—By T. J. Talbert, Prof. of Horticulture, Univ. Mo., and A. E. Murneek, Asst. Prof. Horticulture, Univ. Mo. Lea and Febiger. $3.75.
(See Farmers Digest, June, 1941)

Hunger Signs in Crops—Published by the American Society of Agronomy and The National Fertilizer Review. $2.50.
(See Farmers Digest, October, 1941)

Judging Dairy Cattle—By Edwin S. Harrison, Professor of Animal Husbandry, Cornell University. John Wiley and Sons, Inc. $2.75.
(See Farmers Digest, January, 1941)

Livestock and Poultry Diseases—By W. A. Billings, Asst. Prof. of Vet. Medicine, Univ. of Minnesota. Macmillan Co. $3.50.
(See Farmers Digest, June, 1940)

Livestock Judging Handbook—By Julius E. Nordby, Asst. Prof. Animal Husb., Univ. Idaho, Bu. Animal Industry, 1938, and W. Malcolm Beeson, Ph.D., Asst. Prof. Animal Husb., Univ. Idaho. The Interstate Printers. $2.60.

(See Farmers Digest, February, 1941)

Poultry Husbandry—By Morley A. Jull, Prof. of Poultry Husbandry, Univ. of Maryland. McGraw, Hill & Co. $4.00.

(See Farmers Digest, July, 1939)

Pork Production—By William W. Smith, Prof. of Animal Husbandry, Purdue Univ. Macmillan Co. $3.75.

(See Farmers Digest, September, 1939)

Poisonous Plants of the United States—By Walter Conrad Muenscher, Prof. Botany, Cornell. Macmillan Company. $3.50.

(See Farmers Digest, November, 1940)

Sheep Production—By Levi Jackson Horlacher, B.S.A., M.A., Asst. to Dean, Col. Ag. Univ. Ky. McGraw-Hill Co. $4.00.

(See Farmers Digest, September, 1940)

Soil Conservation—By Hugh Hammond Bennett, Chief, Soil Conservation Service, U. S. Department of Agriculture. McGraw-Hill Book Company, Inc. $6.00.

(See Farmers Digest, December, 1940)

Vegetable Crops—By Homer C. Thompson, Ph.D., Prof. Veg. Crops, Cornell Univ. Pub. McGraw-Hill Book Co. $5.00.

(See Farmers Digest, May, 1940)

The Western Horse—Its Training, Type and Marketing. By John A. Gorman, Asso. Prof. Animal Production, Univ. of Wyoming. The Interstate Printers and Publishers. $1.65.

(See Farmers Digest, March, 1941)

Plant Ecology—By W. B. McDougall, Regional Biologist, Santa Fe, New Mexico. Lea and Febiger. $3.00.

For the convenience of our readers, books listed may be purchased through this Department. Address C. Leavitt Dyer, Farmers Digest, Ambler, Pa.

Soil Conservation Bulletins

To Hold This Soil
Miscellaneous Publication No. 321, U. S. Department of Agriculture
For sale by the Supt. of Documents, Washington, D. C. Price 45c

Terracing for Soil and Water Conservation
Farmers' Bulletin No. 1789, U. S. Department of Agriculture
For sale by the Supt. of Documents, Washington, D. C. Price 10c

What is Soil Erosion?
Miscellaneous Publication No. 286, U. S. Department of Agriculture
For sale by the Supt. of Documents, Washington, D. C. Price 15c

Strip Cropping for Soil Conservation
Farmers' Bulletin No. 1776, U. S. Department of Agriculture
For sale by the Supt. of Documents, Washington, D. C. Price 5c

The Land in Flood Control
Miscellaneous Publication No. 331, U. S. Department of Agriculture
For sale by the Supt. of Documents, Washington, D. C. Price 10c

Conservation Farming Practices and Flood Control
Miscellaneous Publication No. 253, U. S. Department of Agriculture
For sale by the Supt. of Documents, Washington, D. C. Price 5c

Soil-depleting, Soil-conserving and Soil-building Crops
Leaflet No. 165, Department of Agriculture
For sale by the Supt. of Documents, Washington, D. C. Price 5c

Soil Conservation Districts for Erosion Control
Miscellaneous Publication No. 293, U. S. Department of Agriculture
For sale by the Supt. of Documents, Washington, D. C. Price 10c

Soil Defense in the Northeast
Farmers' Bulletin No. 1810, U. S. Department of Agriculture
For sale by the Supt. of Documents, Washington, D. C. Price 15c

Erosion on Roads and Adjacent Lands
Leaflet No. 164, U. S. Department of Agriculture
For sale by the Supt. of Documents, Washington, D. C. Price 5c

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The rules are as follows:

1. The contest is open only to boys who are members of a 4-H Club, and who will graduate from high school by July 1st, 1942.

2. Each contestant must submit an article of not more than 1500 words on some project undertaken by him in his 4-H Club work at some time during the past three years. The article should contain as many facts and figures as possible.

3. The article must be the original work of the contestant. It must be typed, double spaced on regulation typing paper measuring 8½" by 11". Only one side of the paper is to be used.

4. Each story submitted must be read by the county agent under whom the project was carried out and must be signed by him.

5. The 4-H Club Extension Service in Washington, D. C., will judge all articles, and their decision will be final.

6. The Farmers Digest reserves the right to publish any article submitted in the contest.

7. The Farmers Digest will pay one hundred dollars ($100) towards the further education of the author of the winning article. The money will be paid to the educational institution chosen by the winner and will be applied towards his expenses while there.

8. A one-year subscription to the Farmers Digest will be sent to each of the five boys winning honorable mention in the contest.

9. All articles must be postmarked not later than January 1st, 1942, and mailed to the Farmers Digest, Ambler, Pennsylvania.

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